Themes of the course:
★ Wide variety of earth resources
★ Where resources occur is controlled dominantly by geology (not politics or economics!)
★ Cycles/circles – geologic and political
★ Complexity of geology: time issues, scale/spatial issues, interrelated variables
★ Earth and the development of Earth resources as a dynamic process

→ What are “resources”?

“If it can’t be grown, it has to be mined.”

Modern concerns about resources:

Driving force behind our use of resources is __________

→ How do we manage to support an increasing world population?

Important environmental consequences to the support of an increasing population

Always read FOCAL POINTS (first page of chapter) before and after reading a text chapter.

“Resources are like air, of no great importance until you are not getting any.”
(Unknown author)

Our focal points:

**Growth curves – linear vs. exponential
**Population growth – assessment, representation, prediction
**4 kinds of resources
**Resources vs. reserves

Prosperity of a country: parameters of judgement

Resources are geographically dispersed (why?). No country has all that it needs (compare Saudi Arabia with all of its oil and South Africa with all of its gold and diamonds).

Population (growth) provides largest pressure on resource use

OVER ➔
Compare: linear vs. exponential relationships. Where “x” is time, the graph shows rates of change.

How have we enabled Earth’s incredible population growth, especially in recent centuries?

**Rates:** food production vs. population “production”

Fig. 1.1. Note axes. Y-axis: each group plotted with its own scale

Rates of increase; compare slopes of the lines

Some answers to population demands: knowledge and wisdom, technology, materials

What are the predicted population trends? Fig. 1.2: linear vs. exponential growth over time.

Fig. 1.5 (p. 10): x-axis is linear; y-axis is exponential

6 billion people worldwide in 1999 and 7.4 billion in early 2016; 11-12 billion predicted by 2100 A.D. (Level-off)

How do population growth rates affect age statistics and vice versa?
Age-sex pyramids: proportions of people in specific age groups. Predictive capability.

4 major types of resources:
Metals: abundant, scarce.
Non-metallic materials, e.g., for construction, making chemicals
Water and soil

Renewability
Most mineral resources are non-renewable (on time scale of a human life)

Evaluate renewability of resources, e.g., water. RATES (demand vs. replacement)

Geochemical and geologic cycles: where do elements reside (materials), how do they get moved around (processes), where do they end up (natural and human-controlled materials)

Fig. 1.9 (p. 17): resources vs. reserves

**Resource:** total amount (geologically) ultimately available of a particular element/substance
**Reserve**: portion of the resource that can be mined *legally today at a profit* ["shovel-ready"]

- Economic factors, including environmental costs (monetary, regulatory)
- Political factors (sanctions, tariffs, unreliable availability)

**Ores**: metallic materials that are reserves

New consideration of recyclables as part of the resource base.

- Consider for next class: What kinds of *things* (e.g., coal or oil for home-heating) or *goods* (musical records) *used to be* in high demand and now are gone or are being phased out? Why?