Natural Resources & Civilizations
EarthSci 3300 - Spring 2015

This syllabus is subject to change over the course of the semester…

Discussions:	M 12:00 to 12:50	(Latham Hall 125 or 111)
Professor:	Dr. Chad Heinzel	(Latham Hall 116)
Office hours:	By appointment and (open door = If I'm in my office please stop by)	
Office phone:	273-6168	
Email:	chad.heinzel@uni.edu	
Text:	None! All class materials available on www.exploreiowageology.org	
Final Exam:	***Open***	

	Lecture Schedule	**Readings or Media**
Week One (March 9-13)	Wicked Problems, Science, and You Logistics On-line *Activity 1 – OR In class quote project*	Handout
Week Two (March 16-20)	*NO CLASS: Spring Break*	
Week Three (March 23-27)	Natural Resources, their uses, and implications Minerals, rocks, soil, water On-line activities 3, 4, and 5	Handout
Week Four (March 30-Ap3)	The Archaeological Record *Is Humanity capable of learning from past mistakes*? On-line Activity 6 – Survival	
Week Five (April 6-10)	The Roman Civilization On-line Activity 7 – in person	Handout
Week Six (April 6-10)	Reasons Civilizations Collapse or Thrive On-line Activity 8 - *Fossil Fuel Debate*	
Week Seven (April 13-17)	Natural Hazards and Human Life/ Earthquakes and Eruptions In class work, substitute with on-line activity 2 or 9	Handout
Week Eight (April 20-24)	Fragility and the Evolution of Humanity Science, Religion, and Community On-line activity 10	Podcast
Week Nine (Ap.27-May1)	Agents of change Getting ready to explore southern Italy/Sicily In class work, substitute with on-line activity 2 or 9	
Week Ten (May 4-8)	*Finals* - No class	

Grading procedure and policies

A >93%, A->90%
B+>87%, B >83%, B->80%
C+>77%, C >73%, C->70%
D+>67%, D >63%, D->60%
F < 60%

In-class students – Simply come to each class session, participate, ask questions, and complete the assignments.

On-line only students

There are 11 activities on the course website http://www.exploreiowageology.org/CapstoneSouthernItaly.php , of the 11 activities 10 of them have worksheets. Complete the 10 activities with worksheets and e-mail the completed worksheets to me (chad.heinzel@uni.edu). You may complete the activities/worksheets in any order. The final date to turn in worksheets is April 29.

Mixed (Some in-class, some On-line)

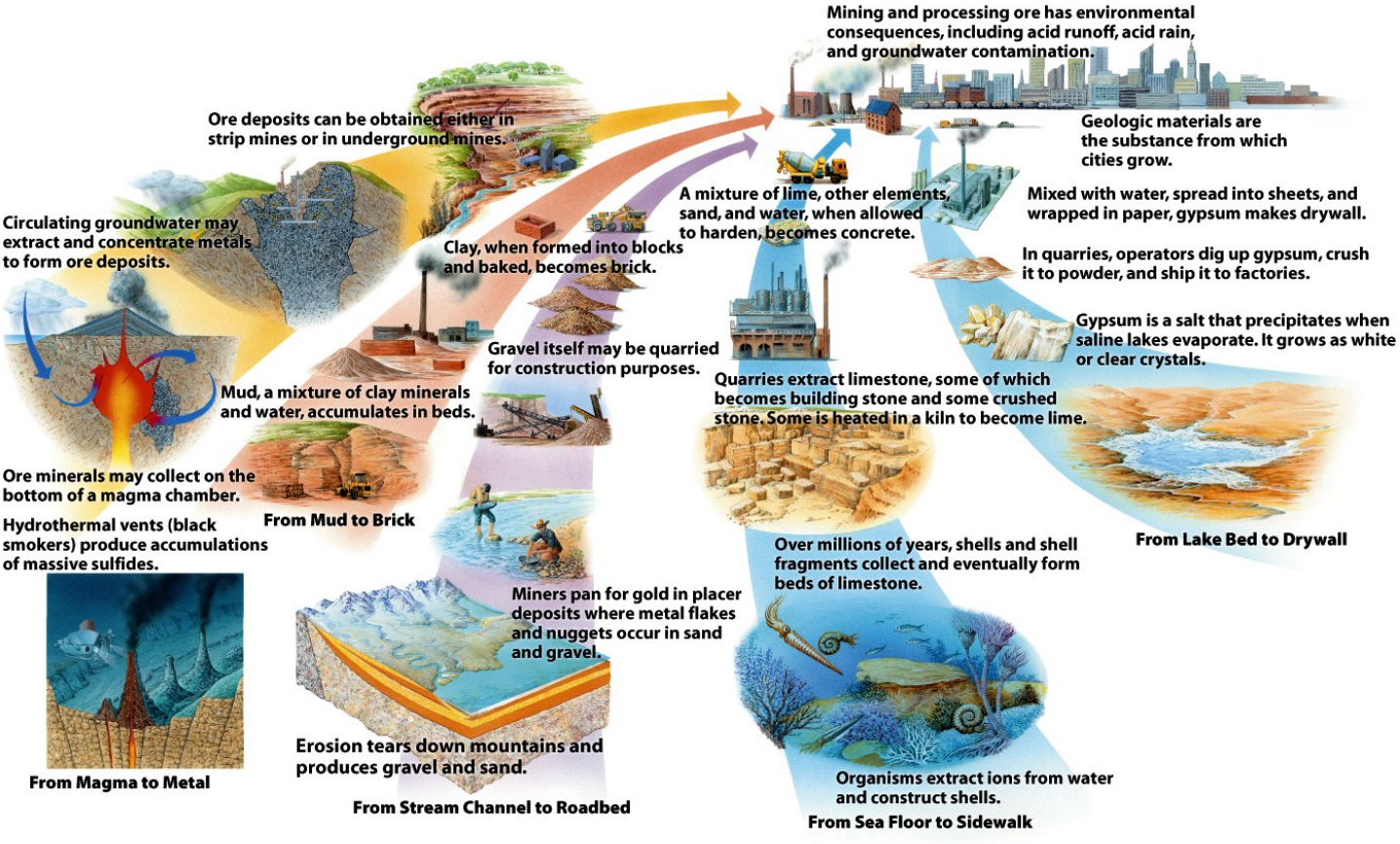
For any in class absence, complete the associated on-line activities and worksheets for that week and e-mail the completed worksheets to me (chad.heinzel@uni.edu). For example if you cannot attend class during week 8 (Monday, April 20) complete On-line activity 10 as stated in the syllabus.

Basic course objectives

Your liberal arts education - Courses in natural science promote an understanding of science as a human process that investigates matter and energy acting within complex organic and inorganic systems. Fundamental principles of both physical and life sciences are included.
1. Learn about the Earth's natural resources, where they come from, how they are used, and ultimately how the can make or break a civilization.
2. Begin seeking pathways of **positively** interacting with your environment & influencing your society.

Special Needs: Any students who require special accommodations for learning please let me know (privately) as soon as possible.

Natural resources are natural assets (raw materials) occurring in nature that can be used for economic production or consumption. Naturally occurring resources/assets provide benefits such as - energy a source of economic activity. These resources/asses are subject to depletion through human use. They are subdivided into four categories: mineral and energy resources, soil resources, water resources and biological resources.



Page 538 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks

Climate Principles - You shouldn't leave this class without!!!

Principle #1 Humans can take actions to reduce climate change and its impacts.

Actions taken by individuals, communities, states, and countries all influence climate. Practices and policies followed in homes, schools, businesses, and governments can affect climate. Climate-related decisions made by one generation can provide opportunities as well as limit the range of possibilities open to the next generation. Steps toward reducing the impact of climate change may influence the present generation by providing other benefits such as improved public health infrastructure and sustainable built environments.

Principle #2 The Sun is the primary source of energy for Earth's climate system.

Sunlight reaching the Earth can heat the land, ocean, and atmosphere. Some of that sunlight is reflected back to space by the surface, clouds, or ice. Much of the sunlight that reaches Earth is absorbed and warms the planet.

Principle #3 Climate is regulated by complex interactions among components of the Earth system.

Earth's climate is influenced by interactions involving the Sun, ocean, atmosphere, clouds, ice, land, and life. Climate varies by region as a result of local differences in these interactions.

Principle #4 Life on Earth depends on, is shaped by, and affects climate.

Individual organisms survive within specific ranges of temperature, precipitation, humidity, and sunlight. Organisms exposed to climate conditions outside their normal range must adapt or migrate, or they will perish.

Principle #5 Climate varies over space and time through both natural and man-made processes.

Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location. Climate descriptions can refer to areas that are local, regional, or global in extent. Climate can be described for different time intervals, such as decades, years, seasons, months, or specific dates of the year.

Principle #6 Our understanding of the climate system is improved through observations, theoretical studies, and modeling.

The components and processes of Earth's climate system are subject to the same physical laws as the rest of the Universe. Therefore, the behavior of the climate system can be understood and predicted through careful, systematic study.

Principle #7 Human activities are impacting the climate system.

The overwhelming consensus of scientific studies on climate indicates that most of the observed increase in global average temperatures since the latter part of the 20th century is very likely due to human activities, primarily from increases in greenhouse gas concentrations resulting from the burning of fossil fuels.

Principle #8 Climate change will have consequences for the Earth system and human lives.

Incidents of extreme weather are projected to increase as a result of climate change. Many locations will see a substantial increase in the number of heat waves they experience per year and a likely decrease in episodes of severe cold. Precipitation events are expected to become less frequent but more intense in many areas, and droughts will be more frequent and severe in areas where average precipitation is projected to decrease.

Source materials =
Geology – www.earthscienceliteracy.org
Climate – www.cleanet.org

Big ideas you shouldn't leave this class without!!!

BIG IDEA 1. Geologists use repeatable observations & testable ideas to understand & explain our planet.

1.1 **Earth scientists find solutions to society's needs.** Earth scientists work on challenging problems that face humanity on topics such as climate change and human impacts on Earth. Earth scientists successfully predict hazards to humans and locate and recover natural resources, making possible the flourishing of humans on Earth.

BIG IDEA 2. Earth is 4.6 billion years old.

2.1 Earth's rocks and other materials provide a record of its history. Earth scientists use the structure, sequence, and properties of rocks, sediments, and fossils to reconstruct events in Earth's history. Decay rates of radioactive elements are the primary means of obtaining numerical ages of rocks and organic remains. Understanding geologic processes active in the modern world is crucial to interpreting Earth's past.

BIG IDEA 3. Earth is a complex system of interacting rock, water, air, and life.

3.1 The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere. The geosphere includes a metallic core, solid and molten rock, soil, and sediments. The atmosphere is the envelope of gas surrounding Earth. The hydrosphere includes the ice, water vapor, and liquid water in the atmosphere, the ocean, lakes, streams, soils, and groundwater. The biosphere includes Earth's life, which can be found in many parts of the geosphere, hydrosphere, and atmosphere. Humans are part of the biosphere, and human activities have important impacts on all four spheres.

BIG IDEA 4. Earth is continuously changing.

4.1 Earth's geosphere changes through geological, hydrological, physical, chemical, and biological processes that are explained by universal laws. These changes can be small or large, continuous or sporadic, and gradual or catastrophic.

BIG IDEA 5. Earth is the water planet.

5.1 Water is found everywhere on Earth, from the heights of the atmosphere to the depths of the mantle. Early in Earth's history, surface water accumulated through both out-gassing from its interior and the capture of some extraterrestrial ice. Water vapor in the atmosphere condensed and rained out as the planet cooled.

BIG IDEA 6. Life evolves on a dynamic Earth and continuously modifies Earth.

6.1 Fossils are the preserved evidence of ancient life. Fossils document the presence of life early in Earth's history and the subsequent evolution of life over billions of years.

BIG IDEA 7. Humans depend on Earth for resources.

7.1 Earth is our home; its resources mold civilizations, drive human exploration, and inspire human endeavors that include art, literature, and science. We depend upon Earth for sustenance, comfort, places to live and play, and spiritual inspiration.

BIG IDEA 8. Natural hazards pose risks to humans.

8.1 Natural hazards result from natural Earth processes.
These hazards include earthquakes, tsunamis, hurricanes, floods, droughts, landslides, volcanic eruptions, extreme weather, lightning-induced fires, sinkholes, coastal erosion, and comet and asteroid impacts.

BIG IDEA 9. Humans significantly alter the Earth.

9.1 Human activities significantly change the rates of many of Earth's surface processes. Humankind has become a geological agent that must be taken into account equally with natural processes in any attempt to understand the workings of Earth's systems. As human populations and per capita consumption of natural resources increase, so do our impacts on Earth's systems.

BIG IDEA 10. Becoming an earth scientist is an extremely meaningful and rewarding career!