

Physical Science Team (Audrey, Jason, Gary)

Physical Science topics for proposed course (textbook):
Physical Science in Remote Sensing with Native American perspective.

Categorization: Due to overlap of far-reaching topics, four main categories have been selected:

Earth (geology)
Air (meteorology)
Water (hydrology)
Fire (energy)

The following topics were selected based on remote sensing data being available, and categorized by perceived main content:

Sedimentation (geology) (addressed)
Desertification (geology) (addressed)
Deforestation (geology) (addressed)
Salinization of soils (geology) (addressed)
Radon mapping (meteorology) (addressed)

Air pollutants (meteorology) (addressed)
Cloud formation (meteorology) (addressed)
Water quality testing (hydrology and GIS) (addressed)
Ice formation (hydrology) (addressed)
Reflectivity (energy) (addressed)

Emissivity (energy) (addressed)
Invasive species (life science, GIS) (addressed)
Forest fire (energy) (addressed)
Drought (meteorology) (addressed)
Ocean currents (hydrology)

Aurora borealis (meteorology)
Stream classification (hydrology)
Mineral identification (geology)
Acid mine drainage (geology)
Global illumination (energy)
Oil spills (hydrology)
Phytoplankton and algae blooms (hydrology-life science)
Hazardous weather- tornadoes, hurricanes (meteorology)

Destructive earth processes-weathering, volcanoes, earthquakes (geology)
Wetlands (hydrology, life science)

Instrumentation
Locating databases

Format of topic presentation:

Written form:

- Lecture (two pages)
- Laboratory
- Remote sensing or GIS examples, questions, and/or case studies (local if possible)
- Cultural content (local examples if possible)

Further breakdown of physical science topics into subtopics which can be incorporated:

Ocean currents: current maps, warming effects, salinity, winds, heating/cooling

Aurora borealis: plasma, solar wind, fluorescence, magnetic fields

Stream classification: riparian classification, stream velocity, erosion, meandering, sediment load, vegetation

Mineral ID: signature reflectivities, ground truth, topography, LIDAR, mineral uses

Acid mine drainage: chemical reaction, mining strategies, other Pollutants

Global illumination: comparative intensities, energy expended, fishing lights, oil field flares, slash and burn ag

oil spills: immiscible liquids, density, grades of petroleum, effect on biological systems, bioremediation, dilution, phytoplankton and algae blooms: food chains, aquatic plant adaptation, organic reactions leading to eutrophication, toxicity chemistry

hazardous weather: latent heat of vaporization, condensation, fronts and cyclones, coriolis effect, snow formation, condensation nuclei

destructive earth processes: subduction zones, convection, plate tectonics, piezoelectric energy, magma content, explosive lakes (CO₂), gas expansion with heating

wetlands: definition, salt science, soil permeability, filtering capability, oxygen chemistry, vegetation, hydrologic budget, pH, redox.

Work plan: Audrey, Gary and Jason will choose at least two of these topics and develop lecture and lab. So far Jason will take stream classification and wetlands, Gary will take mineral ID and acid mining. Audrey already did sedimentation, reflectivity, emissivity, water quality testing, radon mapping, deforestation, desertification, saline soils, cloud formation, air pollution, and ice formation and may or may not do two more.