9-2002

GEOL 207.01: Geological Hazards and Disasters - Understanding, Prediction, Avoidance, Prevention

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Geology 207, GEOLOGICAL HAZARDS AND DISASTERS Fall, 2002
Understanding, Prediction, Avoidance, Prevention
Tu, Th, 10-11 in SC 348 **Don Hyndman**, office, SC 357

Prerequisite: 100-level Geology course except 106 with C grade or better

Text: "Natural Disasters" by Patrick Abbott, 3rd ed., 2002, WCB/McGraw-Hill
[Text pages listed in square brackets]

•A modern structural-steel skyscraper collapses in an earthquake while a nearby old building survives. Why?
•A town on a nearly flat area well away from a volcano that hasn't erupted in historic time is incinerated when the volcano erupts, even though only ash erupted. Why?
•Coastal houses on a long-overgrown barrier island bar standing 10-feet above sea level are submerged, then washed away in a hurricane. Why?
•A town on the floodplain behind a protective levee is severely flooded even though the levee doesn't fail. Why?
•A group of houses on a hillside that has been there for thousands of years collapses in a landslide. Why?

In this course we will examine geological hazards and often disasters, the processes that control them, how they can be predicted and avoided, and how we can minimize their occurrence and effects. More and more we live in locations that are clearly hazardous. Sometimes the hazards are obvious, sometimes more subtle. Seeing the results of disasters, we wonder how people could be so ignorant as to put themselves in such hazardous positions. In many cases disasters cannot be prevented; in other cases our attempts at preventing or minimizing a problem creates greater hazards or disasters for others.

Topics and ***tentative*** dates:

Tu, Th, Sept. 3, 5
Earth equilibrium, uniformitarianism versus catastrophism, Chaos/complexity/ criticality theory, hazard and risk analysis, tectonic [p. 2228] and climate controls, global warming, societal reactions, population pressures, **Probability, frequency**, cycles, **recurrence intervals**; magnitude of the event; causes; the role of **overlapping unrelated events.**

Tu, Th, Sept. 10, 12, Tu, Th, Sept. 17, 19, Tu, Sept. 24
Earthquakes [Abbott, p. 53-85]
Types of waves, magnitude scales
Frequency, site response, building design,
Case histories in different tectonic environments [86-138]

Th, Sept. 26, Tu, Th, Oct. , 3 , Tu, Th, Oct. 8, 10
Volcanoes [Abbott, p.139-160]

Different magmas, explosivity; types of eruptions and their hazards,
including lava flows, air-fall ash, ash flows, mudflows, poisonous gases
Case histories of volcanoes and their eruptions
in different tectonic environments [161-186]
Monitoring and prediction of eruptions: short term, long term.

Tu, Th, Oct. 15, 17
Short-term climate changes, cycles? [Abbott, p. 220-244]
El Ninõ/La Ninõ
Weather, temperature and pressure differences, trade and westerly winds, adiabatic
cooling, cold and warm fronts, **cyclonic circulation** [245-272]

Tu, Th, Oct. 22, 24, Tu, Th, Oct. , 31
The coast and waves: wave characteristics, summer and winter beaches, wave refraction
and longshore drift; sand supply and cliff erosion; groins, jetties, and breakwaters;
examples. [291-304]
Hurricanes and other cyclones: categories, storm surges [273-291]
Hurricane case histories

Tu, Th, Nov. 5, 7, Tu. Nov. 12, Th, Nov. 14, Tu, Th, Nov. 19, 21
River floods: Stream behavior, equilibrium, natural channel response, flood control,
channelization, dams, urbanization, hydrographs, flood frequency, Case histories, giant
floods [Abbott, p. 305-334]

Tu, Th, Nov. 26, 28; Tu, Th, Dec. 3, 5, Tu, Dec. 10
Landslides: movement types, factors controlling downslope movement, soil strength,
friction, water, clays [Abbott, p. 187-219]
Rockfalls, debris avalanches, debris flows, mudflows, translational slides, rotational
slumps, liquefaction and soil flow, expansive soils and soil creep

Th, Dec 12
Tsunami: From vertical sea-floor movement, landslides, caldera collapse, or asteroid
impact. Velocities and wave periods; examples [Abbott, p. 66-71]

Dec. 16-20: FINALS WEEK

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Course Grade based on: 2 midterms worth 25% each
Final exam worth 50%