Natural Hazards

Course # EAES 4146

Credits 6

Prerequisites: Geomorphology

Course Description

Natural hazards continually modify landscapes, sometimes slowly (chronic hazards) and often episodically. They can be defined as phenomena that originate in the lithosphere, atmosphere, hydrosphere, cryosphere, or biosphere that have the potential to exert either an extreme impact on humans and/or the natural environment or a more progressive, cumulative impact. When these hazards cause damage to property, infrastructure, environmental investments, or affect people, they become disasters. Natural hazards and related disasters are global phenomena and are becoming increasingly important in Central Asia. Effectively managing hazard risk reduces the human, economic, and environmental consequences. The course primarily focuses on hazards that occur in mountain environments in a global context; however, many examples are taken from the Central Asia region and similar areas. As such, the primary focus of the course is on erosion processes of all types, related hydrological hazards, and mass wasting (e.g., floods, landslides, debris flows, rock fall, extreme soil erosion, desertification, glacial lake outburst floods), as well as the atmospheric or seismic phenomena driving these hazards. Also, an overview of hazard risk and vulnerability, earth and volcanic hazards, drought, and cold region hazards will be presented. For each hazard, the intrinsic physical processes are introduced along with the consequences of the potential disasters. For those hazards affected by human activities (e.g., sediment hazards), interactions with land use will be covered. Where relevant, the effects of climate change and climate perturbations on hazard occurrence and severity will be discussed. Central to all hazard lectures is the consideration of hazard risk and risk mitigation.

Course learning outcomes

Upon completion of the course students should be able to:

- Articulate the concept of risk related to hazards and apply this to various hazard scenarios.
- Distinguish between chronic and episodic hazards and relate this to the types of disasters that may occur.
- Understand and assess the processes that initiate and perpetuate a wide of natural hazards.
- Predict where different hazards are likely to occur and why.
- Appraise how hazard vulnerability and resilience affect hazard risk.
- Identify how climate change and climate perturbations may affect various hazards in the future.
- Evaluate how human activities affect the magnitude and frequency of certain hazards.

- Develop problem solving skills related to complex hazard scenarios and their mitigation.

Course Assessments and Grading

Item	**Weight**
Mid-term exam	20%
Natural hazard term paper based on literature synthesis and possibly data assessment	20%
Class participation & attendance (including in-class exercises); includes field trip and short report (mandatory attendance)	20%
Final Exam (comprehensive)	40%