**BACKGROUND**

GEGN 468 encourages students to synthesize basic engineering and geology concepts in the context of problems relevant to the field of Geological Engineering while promoting creative problem solving in the context of engineering design problems.

GEGN 468 includes three “lecture” hours per week and one three hour lab, which is sometimes used for local field trips. Typical enrollment is ~30 students.

By the end of the course, students should be able to:

- Describe key engineering properties and behaviors of commonly encountered geomaterials
- Recognize the key geological factors relevant to dam siting, foundation stability, earthquake hazards, tunnel design, and slope stability
- Identify which earth material behaviors and hazards are relevant to a given engineering geology design problem
- Assess the adequacy of different material characterization and technical analysis tools for investigation of a given engineering geology problem
- Analyze engineering geology problems using methods and tools commonly applied in industry
- Design solutions to mitigate geological risks associated with natural and man-made slopes and underground excavations in rock
- Concisely communicate data collection, data analysis, and design processes and results to a technical audience in written and oral formats using appropriate technical vocabulary and graphical aids

**WHAT IS CHANGING**

This course revision has focused on three areas:

**Promoting Student Self-Reflection**

- Topic-level learning outcomes will be reviewed at the beginning and end of each topic
- Students will perform self-assessments on each lab/project report prior to final submission

**Enabling Active Learning**

- Student activities have been planned at various points during traditional lectures
- Individual reflection (e.g. minute papers), pair-brainstorming, and pair problem-solving are the primary activity types being used
- Lecture-style communication during “lab” periods has been reduced from previous offerings

**Emphasizing Written Communication Skills**

- The link between development of communication skills and student learning of technical concepts is reflected in the design of course projects/assignments and will be emphasized to students throughout the course
- A rubric has been designed for the written deliverables which emphasizes communication aspects

**INTENDED RESULTS**

The primary intended result of the revision process is an improved attainment of course learning outcomes for all GEGN 468. Additionally, the following ancillary benefits are anticipated:

- Increased student engagement during class periods
- Better student preparation for their final design course during the following semester (GEGN 469)
- An opportunity to study factors influencing student advancement of written communication skills
- Improved student attitudes towards technical communication and its role in the field of Geological Engineering

**Example Assignment Components – Rockfall Hazard Analysis**

**Problem Statement:** The problem statement will outline the practical significance and context of the assignment. This assignment will focus on a rockfall hazard assessment as part of a feasibility study on mountain highway development for CDOT.

**Task Description:** The task description will mimic what students might encounter in industry. This assignment has the following tasks: assessment of possible rockfall modes; calculation of factors of safety for potentially unstable blocks; assessment of the potential effectiveness of reinforcement techniques; assessment of result sensitivity to uncertainty and variability.

**Deliverables:** Students will receive a brief description of the type of deliverable expected.

**Typical assignment/project flow (~2 wks total):**

- First Lab Period – Brief introduction by instructor and time for independent and group work
- Homework – Student progress on analysis/design and report preparation
- Second Lab Period – Time for students to address sticking points with instructor support
- Draft Submission – Peer-review and then self-review are performed using a rubric
- Report Revision – Students revise their reports based on peer feedback and self-reflection
- Final Submission – Reports are evaluated using the same rubric used by students

**Students on a field trip mapping a slope**

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