Engineering Faculty Document 2-06
May 9, 2006

MEMORANDUM

TO: The Faculty of the Schools of Engineering

FROM: The Faculty of the School of Civil Engineering

RE: New Graduate Level Course CE 685

The faculty of the School of Civil Engineering has approved the following new course. This action is now submitted to the Engineering Faculty for a recommendation for approval.

CE 685 Rock Mechanics

Sem. 1, Class 3, Lab 0, Cr. 3

Prerequisite: CE 580 or instructor consent

Mechanical properties governing rock behavior, from intact rock to fractured rock masses. Laboratory experiments and field tests. Failure criteria. Linear Elastic Fracture Mechanics. Rock mass deformability. Analytical and empirical approaches for the design and construction of civil engineering structures in rock masses. Slope stability. Bearing capacity of shallow and deep foundations.

Reason: To provide students with the fundamental knowledge and skills to design and build civil structures on intact rock and on fractured rock masses. The course builds on the geotechnical fundamentals of CE 580 or similar courses.

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M. Katherine Banks, Head
School of Civil Engineering

Supporting documentation

1. **Justification:** Traditionally the geotechnical specialty in Civil Engineering has focused on the behavior of soils; however, this is only a small set of the geomaterials that a geotechnical engineer will encounter in his or her professional career. About 15% of the continental surface area is occupied by transported soils (i.e. alluvial, glacial, wind deposits). The other 85% is occupied by rocks. The course exposes students to the behavior and problems associated with rock materials and rock masses.

2. **Level:** Graduate Level

3. **Prerequisites:** CE 580 or instructor consent

4. **Instructor:** Antonio Bobet

5. **Course objectives:** Students who complete the course should be able to:

   - Understand and predict the behavior of intact rock under complex loading
   - Predict failure mechanisms and critical stress of intact rock and rock masses
   - Design laboratory and field tests to investigate mechanical properties of rock masses
   - Understand fundamental concepts of Linear Elastic Fracture Mechanics
   - Design excavations in rock mass
   - Design shallow and deep foundations in rock masses

6. **Course Outline:**

Lectures	**Topics**
3	Introduction to intact rock and rock classification systems
6	Strength and deformation of intact rock
3	Failure criteria: Tresca, Coulomb, Hoek-Brown
5	Linear Elastic Fracture Mechanisms: Principles and applications
4	Discontinuities within a rock mass. Analytical and empirical failure criteria
9	Slope stability: planar, wedge and toppling failure
9	Foundations on rock: shallow and deep foundations
3	Monitoring
2	In-class exams
Total 44	

7. **Text:** Class notes and other materials distributed in class