**FE/CE 479/579**

**Slope and Embankment Design**

**Instructor:** Ben Leshchinsky

**Office Hours:** F 1000-1200  
273 Peavy Hall

**Credits:** 3 Credits

**Course Schedule:** Tuesday and Thursday 1400-1520 in PVY 104.

**Prerequisites:** FE316 or CE 373 (Equivalent courses in CCE and FERM)

**Learning Resources:**
- *Soil Strength and Slope Stability*, Duncan and Wright (Optional)
- *Designing with Geosynthetics*, Koerner (Optional)

**Course Content:**

<table>
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<tr>
<th>Week</th>
<th>Lecture</th>
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| 1    | Course Introduction  
      | Common Slope and Embankment Problems  
      | Landslide mechanics and impacts |
| 2    | Factors affecting Slope and Embankment Behavior  
      | Site Investigation and Strength Testing  
      | Landslide Investigation  
      | Stress, Strength and Consolidation Concepts  
      | **Homework 1 Assigned** |
| 3    | Mechanics of wedge failures, Infinite Slope Method  
      | Bishops Method, Spencer’s Method, Moment Equilibrium Analyses  
      | **Homework 2 Assigned / Homework 1 Due** |
| 4    | Force Equilibrium Analyses  
      | Limit Analysis, Finite Element Analysis  
      | **Homework 3 Assigned / Homework 2 Due** |
| 5    | Computerized Slope Stability Analyses  
      | Computerized Slope Stability Analyses  
      | **Slope Stability Project Assigned / Homework 3 Due** |
| 6    | Slope Stabilization Methods  
      | Embankment Design |
| 7    | **Slope Stability Project Presentations** |
Course Outcomes: FE/CE 479

1. Demonstrate knowledge of soil strength and its application to basic slope stability problems (cut and fill slopes, homogenous slopes). (ABET outcomes: a)
2. Apply slope stability methods to engineered and natural earth slopes and embankments. (ABET outcomes: a, b, e, g, k, o)
3. Apply design and remediation principles to slopes in situations of moderate geotechnical difficulty. (ABET outcomes: a, b, e, g, k, o)
4. Demonstrate knowledge of design principles for mechanically stabilized earth walls and reinforced steep slopes. (ABET outcomes: a, c, e, k, o)
5. Employ slope stability principles design principles to reinforced soil structures with geosynthetics for mechanical reinforcement. (ABET outcomes: a, e, o)
6. Identify geosynthetic hydraulic barriers or conduit applications. (ABET outcomes: a, e, k)

Added Graduate Course Outcomes: FE/CE 579

1. In addition to the undergraduate outcomes, graduate students will formulate and evaluate complex slope stability problems (tiered slopes, multi-layered stratigraphy, structural elements). This includes analysis and indetification of critical failure mechanisms for natural and engineered slopes using a variety of approaches.
2. In addition to the undergraduate outcomes, graduate students will calculate the stability of engineered and natural earth slopes and embankments under adverse hydraulic, seismic and staged construction conditions.
3. In addition to the undergraduate outcomes, graduate students will be able to synthesize practical and theoretical aspects of soil mechanics for design of stable slopes in situations of high geotechnical difficulty.
4. In addition to the undergraduate outcomes, graduate students will assess the stability of mechanically stabilized earth walls and reinforced steep slopes while evaluating the strength limit state and service limit state conditions.

Evaluation of Student Performance

3 Homework Assignments:
- Performed Individually
• 30% of Total Grade
Slope Stability Project:
• Performed in groups for undergraduates, individually for graduate students
• 30% of Total Grade
Geosynthetic Design Project:
• Performed in groups for undergraduates, individually for graduate students
• 15% of Total Grade
Final Exam
• Performed Individually
• 20% of Total Grade
Participation
• Active leadership in class discussions required for graduate students
• Active participation in class discussions/group activities required for undergraduate students.
• 5% of Total Grade

For Students with Disabilities:
"Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."

Expectations for Student Conduct:
http://oregonstate.edu/studentconduct