

**CSES 5984 — Advanced Reclamation of Drastically Disturbed Areas**  
**Fall Semester 2004**

**Instructors:** W. Lee Daniels, CSES Dept., 244 Smyth Hall  
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**Time/Location:** T/Th 9:30 to 10:45, TBA

**Credits:** 3 hours of lecture; 3 credits  
Course also includes two mandatory field trips, and a local field study project.

**Prerequisites:** Graduate standing with a B.S. degree in biology, soil or geological science, forestry, civil engineering, mining engineering, or instructor's consent.

**Course Objectives:** Upon completion of this course, the students will be able to:

1. Understand the detailed history and complex development of the environmental regulatory framework of mining in the USA.
2. Relate the chemical, physical, and biogeochemical properties of mine spoils and mineral processing wastes to their effects on water quality and revegetation success.
3. Determine the optimal pre-disturbance sampling protocol and post-disturbance reclamation strategy for a wide array of mining, highway construction, and urbanization impacts.
4. Understand the basic principals of acid mine drainage formation and treatment.
5. Prescribe optimal soil landscape reconstruction designs for the return of mined lands to agricultural, native vegetation, residential, and industrial uses.
6. Understand the reclamation challenges posed by mining in other countries; specifically Australia, Brazil, China, Eastern Europe, and the United Kingdom.
7. Describe the process whereby local citizens, governments, regulatory agencies, environmental advocacy groups, and the mining industry can successfully develop a framework for sustainable mining practices.

**Evaluation:** Grades will be based upon two mid-term exams (40%), two field trip reports (20%), a local field project study report (15%), and a final exam (25%).

**Required Texts:**

R.I. Barnhisel, R.G. Darmody, and W.L. Daniels (eds.). 2000. Reclamation of Drastically Disturbed Lands. American Soc. Agron./Soil Sci. Soc. Amer. Mono. 41, Madison WI. 1082 pp.

APPROXIMATELY 40 SCIENTIFIC JOURNAL PAPERS AND BOOK CHAPTERS WILL ALSO BE REQUIRED READING

**Lecture Topics:**

1. Introduction and overview
2. USA mining history and regulatory framework
3. Overburden and mineral processing waste analysis
4. Prediction of overburden and mine waste weathering and acid generation
5. Mine soil reconstruction and properties in the eastern USA
6. Mine soil amendment and erosion control stabilization with herbaceous covers
7. Return of mined lands to industrial and native forests
8. Reclamation and stabilization of coal processing wastes
9. Prediction and treatment of acid mine drainage
10. Reclamation of mineral sands and sand & gravel mines
11. Reclamation of metal mining wastes and tailings
12. Reclamation of prime farmlands and semi-arid grasslands
13. Utilization of mining residuals for value added products/waste disposal issues on mined lands
14. Wetland issues and mitigation on mining sites
15. Development of sustainable mining frameworks in a global setting

**Field Trip Topics:**

1. Reclamation of coal mined lands and processing wastes; reclamation to grasslands vs. forest restoration.
2. Reclamation of prime farmlands after mineral sands mining; wetland mitigation.