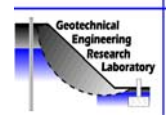




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DEPARTMENT OF CIVIL AND
ENVIRONMENTAL ENGINEERING

Samuel G. Paikowsky, Sc.D
Professor



14.536 Soil Engineering
Spring 2010
Thursday 6-9 PM Kitson 303

Course Website:

<http://faculty.uml.edu/spaikowsky/14.536/>

Textbook:

The purchase of a textbook is not required, as it is out of print. An “official” textbook is assigned to the class and the subjects in the syllabus are related to the chapters in this book: "Foundation Engineering Handbook", edited by Hsai-Yang Fang, Van Nostrand, 2nd ed., 1991.

Reference Texts:

1. “Earth and Earth-Rock Dams”, Sherard J.L. et al, John Wiley, 1963.
2. “Design of Small Dams”, U.S. Dept. of the Interior, Bureau of Reclamation.
3. “Soil Mechanics”, Design Manual 7.1 Dept. of the Navy, Naval Facilities Eng. Command, (NAVFAC DM7.1, May 1982).
4. “Foundations and Earth Structures”, NAVFAC DM7.2, May 1982.
5. “Seepage Drainage and Flow Nets”, Cedergren H.R., Wiley, 3rd ed., 1989.
6. “Engineering and Design Stability of Earth and Rock-Fill Fams” Dept. of the Army, Manual No. 1110-1902, April 1970, (see website below for EM110-2-2300, July 2004).
7. “Designing with Geosynthetics”, Koerner R.M., Prentice hall, 5th ed., 2005.
8. “Engineering Principles of Ground Modification”, Hausmann, M.R., McGraw-Hill, 1990.
9. “Treatment of Problem Foundations for Highway Embankments”, National Research Council, NCHRP Synthesis #147, July 1989.
10. “An Introduction to Geotechnical Engineering”, Holtz, R.D. and Kovacs, W.D., Prentice Hall, 1981
11. “Geotechnical Instrumentation for Monitoring Field Performance”, Dunnycliff, J. and Green, G.E., John Wiley, 1988.
12. “Landslides, Investigation and Mitigation. Special Report No. 247”, Transportation Research Board, National Academy Press, 1996.
13. “Soil Engineering”, Spangler, M.G. and Handy, R.L., Harper Collins 4th edition, 1982.
14. “Slope Stability and Stabilization Methods” Abramson, Lee, Sharma, and Boyce, 2nd edition, Wiley, 2001

Reference Web Sites:

FHWA Geotechnical Publications:
<http://www.fhwa.dot.gov/bridge/geopub.htm>

FHWA Geotechnical Software:
<http://www.fhwa.dot.gov/bridge/geosoft.htm>

US Army Corps of Engineers – Engineering Manuals
<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em.htm>

Geotechnical Software Directory
<http://www.GGSD.com>

Software:

- Slide/Analyze - 2-D Bishop Slope Stability Analysis
- Seep/W - Finite Element Groundwater Flow Analysis
- Reslope - Design Procedure for Geosynthetic Reinforced Steep Slopes, (RSS)
- DEEP Excavation Engineering Program, version 2006

Planned Schedule

1. Attached please find the outline of the planned schedule. The classes consist of regular lectures, seminars and guest lectures. Your participation in the events therefore becomes mandatory and will be considered as part of your grade.
2. For each of the guest lectures, you will be required to submit in the following meeting a short (1 to 2 pages) typed summary based on your notes during that lecture.
3. Each of the students will conduct an independent project according to the attached material. The final grade of the project will consider your performance during all the required stages.
4. There will only be a final exam planned on May 20, 2010.

Final Grade

The approximate grade components are:

- | | |
|---|-----|
| 1. Attendance and guest lecture summaries | 15% |
| 2. Homeworks and computer exercise | 25% |
| 3. Project | 25% |
| 4. Final Exam | 35% |

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<u>Class #</u>	<u>Date</u>	<u>Topic</u>	<u>Text</u>
1	1/28/10	<ul style="list-style-type: none"> • Review - Shear Strength of Soils • <u>Landslides and Slope Stability</u>: Overview, Infinite Slope (dry & flow), wedge (Culman) 	Sect. 3.13, text and Holtz & Kovacs Ch. 11; Chs. 10 & 11
	2/4/10	no class – substitute class to be arranged	
2	2/11/10	<ul style="list-style-type: none"> • <u>Slope Stability</u>: Friction Circle (Taylor) Swedish Circle (Fellenius), Bishop method of slices 	Chs. 10 & 11
3	2/18/10	<ul style="list-style-type: none"> • <u>Dam Design</u>; design consideration, seepage analysis, piping and filter design • Submittal of Project Title/ Description/ Scope 	
4	2/25/10	<ul style="list-style-type: none"> • <u>Embankment & Earth Dam Design</u>, Shear strength and selection of soil parameters, stability conditions and analysis 	
5	3/4/10	<ul style="list-style-type: none"> • <u>Guest Lecture</u>: “Wachusett Reservoir Dam Spillway and North Dike Improvements.” by Jonathan Andrews, PE, GZA GeoEnvironmental Inc., Norwood, MA • <u>Stability of Open Excavations – Unbraced Cuts</u> • Submittal of Project Abstract, Headings and References 	Ch. 12
6	3/11/10	<ul style="list-style-type: none"> • <u>Earth Pressures</u> • <u>Earth Retention Systems</u>: Classification, components and design consideration 	Ch. 6 Ch. 12
	3/18/10	<ul style="list-style-type: none"> • University Closed – Spring Break 	
7	3/25/10	<ul style="list-style-type: none"> • <u>Earth Retention Systems</u> - Braced Excavations 	Ch. 12
8	4/01/10	<ul style="list-style-type: none"> • <u>Guest Lecture</u>: “Design of Braced Excavations.” By Dimitrios Konstantakos, President, Deep Excavation, LLC. • <u>Tutorial, PC Lab</u>: DEEP Excavation Engineering Program – Excavation support software developed and distributed by Dimitrios Konstantakos • Submittal of project progress report 	
9	4/8/10	<ul style="list-style-type: none"> • <u>Instrumentation for Soil Engineering Projects</u> 	

<u>Class #</u>	<u>Date</u>	<u>Topic</u>	<u>Text</u>
10	4/15/10	<ul style="list-style-type: none"> • <u>Observations of Field Performance</u>: Instrumentation and Measurements Interpretation 	
	4/22/10	<ul style="list-style-type: none"> • no class – substitute class to be arranged 	
11	4/29/10	<ul style="list-style-type: none"> • <u>Dewatering and Ground Water Control</u> • PROJECT Due Date 	Ch. 7
12	5/6/10	<ul style="list-style-type: none"> • Guest Lecturer “Groundwater Control for Construction”, Mr. Greg Landry, Asst. Chief Engineer, Moretrench American Cooperation, Dewatering systems and services. • “Ground Improvement - Requirements, Methods of Approach and Design” • PROJECT Reviews are Due 	
13	5/13/10	<ul style="list-style-type: none"> • <u>Students’ Seminars</u> 	
	5/20/10	<ul style="list-style-type: none"> • <u>Final Exam</u> 	

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Term Project

As part of the Soil Engineering class you are required to prepare and present a term project. The project may consist of one or more of the following: literature survey, computer program, case history, data analysis, and laboratory study. Other independent relevant topics are welcome.

The project will be submitted typed, 12 point (double spaced) and should not exceed 15 pages including figures and references. All projects should contain an abstract, table of contents, statement of engineering significance and relevance, conclusions and a list of references.

The project's progress will be followed according to the following steps and time schedule:

- | | |
|-------------|--|
| 1/28 & 2/04 | Choose a topic and discuss its acceptability with the instructor. |
| 2/18 | Submit the title for your project with a short description of the subject and the intended scope of your work. |
| 3/04 | Submit an abstract, headings for the subjects and a list of references. |
| 4/01 | Progress report of the project is due. |
| 4/29 | Completed term projects (2 copies) are due. Each student will be assigned someone else's project for review. |
| 5/6 | Typed, one page discussion with marked comments of the reviewed projects are due. |
| 5/13 | Project presentation. |

The project's grade will reflect the intermediate steps, the soundness of the study, the writing, the review and the presentation.

General Ideas for possible projects:

Computer Programs or Parametric Studies

1. Different slope stability programs
2. Different flow analysis programs
3. Radial consolidation around drains or piles

Others

1. Dewatering
2. Stability of Reinforced Slopes
3. Construction of reinforced walls
4. Different applications of geosynthetics
5. Seismic design of dams
6. Soil stabilization
7. Evaluation of the permeability of Boston Blue Clay
8. Stability of Rock Slope
9. Field instrumentation, review, performance, and/or case histories
10. Staged construction

Note: All projects must contain a written report.