

**CE 322 - SOIL MECHANICS**  
**Weisberg Division of Engineering and Computer Science**  
**Marshall University**  
**SPRING 2009**

**COURSE NAME:** CE 322 – 201 Soil Mechanics (3 Credit Hours)

**CLASS TIME:** Monday and Wednesday 5:30 pm – 6:20 pm

**CLASS LOCATION:** Weisberg 101

**LAB TIME:** Monday 6:30 pm – 9:20 pm

**LAB LOCATION:** Weisberg 124

**COURSE INSTRUCTOR:** Jeffrey T. Huffman, M.S., P.E.  
Adjunct Professor

**OFFICE:** Weisberg 109

**OFFICE HOURS:** 4:30 pm – 5:30 pm Monday & Wednesday  
Following class or lab  
By appointment, call as early as possible

**PHONE & EMAIL:** Work: 746-1140 Cell: 546-9732  
huffmanje@marshall.edu

**COURSE**

**PREREQUISITE:** ENGR 216 – Mechanics of Deformable Bodies  
GLY 200 – Physical Geology

**TEXT BOOKS:**

**CLASS:** Principles of Geotechnical Engineering by *Braja M. Das*, 6<sup>th</sup> Edition

**LAB:** Standards for the tests performed in the laboratory are available on the class website.

**MANUALS & STANDARDS:**

These are references that are available on the class website and on the internet:

UFC 3-220-10N Soil Mechanics (U.S. Army Corps of Engineers)  
UFC 3-220-01N Geotechnical Engineering Procedures for Foundation Design of  
Building and Structures (U.S. Army Corps of Engineers)  
EM-1110-2-1906, Laboratory Soils Testing, U.S. Army Corps of Engineers  
Annual Book of American Society of Testing and Materials (ASTM) Volume 4.08 –  
Soil and Rock

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**PURPOSE, DESCRIPTION AND OBJECTIVE OF THE COURSE**

This course is a core requirement for undergraduate students planning to pursue a career in any area of Civil Engineering. The main objective of this course is to introduce students to basic soil mechanics principles.

Catalog course description is soils: origin, classification, clay, index properties; minerals, stresses in soils; shear strength; permeability; consolidation; bearing capacity; earth pressures; slope stability. Determination of index, strength, deformation, permeability and properties of soils.

Upon completion of this course, students will be able to:

- Visually-manually identify different soil types,
- Classify, both in the field and laboratory, various soils for engineering purposes,
- Perform grain size analysis and consistency tests,
- Understand compaction theory, test to determine laboratory compaction testing and determination of field density,
- Choose the appropriate permeability tests based on soil type,
- Apply permeability, flow net and seepage principles to evaluate uplift pressures, filters and seepage quantity,
- Apply the concept of consolidation settlement and time rate of settlement,
- Perform consolidation tests,
- Evaluate the effective stress condition within a soil mass,
- Understand the concept of drained and undrained shear strength and when to apply each,
- Ability to select the correct test procedure to determine shear strength,
- Design simple shallow and deep foundations,
- Analyze simple soil slopes.

**COURSE POLICIES**

**Attendance**

Attendance for each session of this course (lecture and laboratory) is strongly recommended. The information covered in each class or laboratory is pertinent to understanding of the entire course.

Everybody is required to participate in class discussions and participate in the laboratory exercises. Tentative schedule of the topics to be covered in each lecture and laboratory is attached and is of course subject to modification.

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**Assignments**

All assignments must be turned-in **at the beginning of the class** on the due date given on the assignment. However, if due to some valid reason, you feel that you will not be able to complete the assignment by the due date, please let me know at least **three (3)** days before the due date of the assignment. If I am not in my office, please send me an e-mail or call me.

Homework assignments should be legible, clear, and written in a *professional* manner. Each assignment must have a coversheet with your name, the course number, assignment number, and submission date. Ten percentage points will be deducted if an assignment is submitted without the coversheet. All pages of an assignment should be appropriately labeled and all pages must be properly stapled. An assignment that cannot be read or is not presented in a professional manner will not be accepted.

A class portfolio will be collected at the end of the semester. This portfolio will be a collection of all homework, lab reports and exams. This will make a concise reference for future use. The portfolio will be collected at the final and returned shortly thereafter.

**Communication**

All students must check their Marshall University email accounts often. This is the easiest way for me to communicate collectively to the class. The quickest way to contact me is my Marshall Email address. I receive my Marshall emails on my work computer and cell phone real-time. You may call my cell phone at anytime including evenings. You may call me at work, but please understand that I may not be able to talk at that moment.

**Grading**

You **may be** allowed a reschedule test **only if**: you inform me, and arrangements are made, at least **one week** before the test date. Late assignments will be accepted, but at 50 percent of the scored value.

Every effort will be made to fairly grade the exams and homework assignments. If you feel an error has been made in grading the exam it must be turned-in at the end of the class period it was distributed. Any error in grading of a homework assignment must be submitted within a week for re-grading.

Final grade will be calculated using the grading distribution and final grade assessment provided below.

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*Grade Distribution*

Exam 1	15 %
Exam 2	15 %
Final Exam (Comprehensive)	20 %
Homework Assignments	25 %
Lab (Report & Participation)	20 %
Class Portfolio	5%

*Final Grade Assessment*

<u>Percent Scores</u>	<u>Final Letter Grade</u>
90 and above	A
Between 80 and 89	B
Between 70 and 79	C
Between 60 and 69	D
59 and Below	F

**Honor Policy**

I encourage students to work together and to assist each other in understanding the course material. Under no circumstances should any student violate the following honor policies.

**Cheating:** This includes:

- The unauthorized use of any materials, notes, sources of information, study aids or tools during an academic exercise including homework, laboratory experiments and exams.
- The unauthorized assistance of a person other than the course instructor during an academic exercise including homework, lab experiments and exams.
- The unauthorized viewing of another person's work during an academic exercise including homework, lab experiments and exams.

**Plagiarism:** Submitting as one's own work or creation any material or an idea wholly or in part created by another. This includes oral, written and graphical material that is both published and unpublished works.

**Fabrication/**

**Falsification:** The unauthorized invention or alteration of any information, citation, data.

**Complicity:** Helping or attempting to help someone commit an act of academic dishonesty.

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**Class Courtesy**

No talking during class.

All cell phones and pagers should be turned off during class and lab.

**Weather Emergencies**

This class will follow the university emergency procedure,

<http://www.marshall.edu/emergency/>.

**Policy for Students with Disabilities**

Marshall University is committed to equal opportunity in education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117, phone 304 696-2271 to provide documentation of their disability. Following this, the DSS Coordinator will send a letter to each of the student's instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, please visit <http://www.marshall.edu/disabled> or contact Disabled Student Services Office at Prichard Hall 117, phone 304-696-2271.

**ABET OBJECTIVES**

Item No.	Objective
3a	An ability to apply knowledge of mathematics, science and engineering.
3b	An ability to conduct experiments as well as analyze and interpret data.
3e	An ability to identify, formulate and solve civil engineering problems.
3g	An ability to communicate effectively.
3i	Recognition of the need for and an ability to engage in life-long learning.
3k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

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**Lecture & Laboratory Schedule**

Course Instructor: Jeffrey T. Huffman, M.S., P.E.  
Lecture: Monday and Wednesday 5:30 - 6:20 PM  
Laboratory: Monday 6:30 - 9:20 PM

Lecture No.	Date	Day	Lecture Topic	Reading Assignment	Lab No.	Laboratory Topic & ASTM Standard	Report Due
1	Jan 12	M	Class Administrative Issues Introduction to Geotechnical Engineering & Soil Mechanics	Chapter 1, 2.1 - 2.4	1	Lecture 1 Con't - History of Geotech Eng, Soil Origin & Types. Moisture Content (ASTM D2216) & Specific Gravity (ASTM D854)	---
2	Jan 14	W	Weight-Volume Relationship	3.1 - 3.2	---	---	---
---	Jan 19	M	No Class - M. L. King	No Class	---	No Laboratory - M. L. King	---
3	Jan 21	W	Weight-Volume Relationship	3.3 - 3.6	---	---	---
4	Jan 26	M	Atterberg Limits	3.7 - 3.13	2	Atterberg Limits(ASTM D4318)	---
5	Jan 28	W	Particle size distribution - Sieve Analysis	2.5	---	---	---
6	Feb 02	M	Particle size distribution - Hydrometer Analysis	2.5	3	Sieve & Hydrometer Analysis (ASTM D422 & D1140)	---
7	Feb 04	W	Classification of Soils Part 1	3.4	---	---	---
8	Feb 09	M	Classification of Soils Part 2	3.4	4	Exam Review & Classification of Soil (ASTM D2488, ASTM D2487)	---
9	Feb 11	W	Exam 1	N/A	---	---	---

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10	Feb 16	M	Compaction Theory & Laboratory Compaction	5.1 - 5.6	5	Laboratory Compaction (ASTM D698, ASTM D1557)	Labs 1 to 4
11	Feb 18	W	Compaction & Density in the Field	5.7 - 5.12	---	---	---
12	Feb 23	M	Permeability, Darcy's Law	Chapter 6	6	Field Compaction & Density (ASTM D1556)	---
13	Feb 25	W	Flow Nets	7.1 - 7.6	---	---	---
14	Mar 02	M	Uplift Pressures, Filter, Seepage	7.7 - 7.11	7	Constant (ASTM D2434) & Falling Head (STM 5084) Permeability	Labs 5 & 6
15	Mar 04	W	Stress Distribution in Soils & Stress History	9.1 - 9.15	---	---	---
16	Mar 09	M	Total Stress & Pore Pressures in Soils	Chapter 8	8	Lecture 16 Con't -- Pore Pressure & Effective Stress in Soils	No Reports for labs 7, 8, 9 & 10
17	Mar 11	W	Drained Shear Strength	Handouts	---	---	---
18	Mar 16	M	Undrained Shear Strength	Handouts	9	Make-up lab & Exam Review	---
19	Mar 18	W	Exam 2	N/A	---	---	---
---	Mar 23	M	No Class - Spring Break	No Class	---	No Laboratory - Spring Break	---
---	Mar 25	W	No Class - Spring Break	No Class	---	---	---

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20	Mar 30	M	Subsurface Investigation	Chapter 17	10	Subsurface Investigation (Possible project site visit)	---
21	Apr 01	W	Consolidation Theory	10.1 - 10.9	---	---	---
22	Apr 06	M	Consolidation Settlement	10.10 - 10.14	11	Consolidation (ASTM D2435)	---
23	Apr 08	W	Time Rate of Consolidation	10.15 - 10.20	---	---	---
24	Apr 13	M	Direct Shear	11.1 - 11.6	12	Consolidation (ASTM D2435) & Direct Shear (ASTM 3080)	---
25	Apr 15	W	Triaxial Testing	11.7 - 11.13	---	---	---
26	Apr 20	M	Lateral Earth Pressures Part 1	12.1 - 12.9	13	Direct Shear (ASTM 3080)	Labs 11 & 12
27	Apr 22	W	Lateral Earth Pressures Part 2	12.1 - 12.16	---	---	---
28	Apr 27	M	Shallow & Deep Foundations	Chapter 15 & Handouts	14	UU (ASTM D2850) & CU (ASTM D4767) Testing	Labs 13 & 14 Due May 04
29	Apr 29	W	Slope Stability	Chapter 14	---	---	---
30	May 04	M	Final Examination - 2 hours	N/A	15	No Laboratory	---
31	May 06	W	No Class	N/A	---	---	---