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SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: SOIL MECHANICS AND HIGHWAY ENGINEERING

Code No.: ARC 231-3


Program: CIVIL/CONSTRUCTION

Semester: 3

Date: OCTOBER, 1988

Author: S. IENCO

New: \_\_\_\_\_ Revision: X

APPROVED:   
Chairperson

Oct 24/88  
Date

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CALENDAR DESCRIPTION

SOIL MECHANICS & HIGHWAY ENGINEERING

ARC 231-3

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COURSE NAME

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COURSE NUMBER

**PHILOSOPHY/GOALS:**

The student will reinforce his/her basic understanding of soil formation, identification and classification. In addition the student will be introduced to the engineering properties of soil and movement of water through soil. Sub-grade pavement materials will also be covered.

**METHOD OF ASSESSMENT:**

Lab work	40%
Mid Term Examination	25%
Final Examination	35%
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	100%

- 1) Minimum acceptable grade is 55%.
- 2) Each lab assignment will carry equal weight.
- 3) If, at the end of the semester, your overall average of the combined lab work, assignments, mid semester examination and final semester examination is below 55%, then it will be up to the instructor whether you receive an "R" grade or a rewrite. The criteria employed for arriving at that decision is class attendance, class participation and overall grade.
- 4) If a rewrite is granted, it will be given for the examination portion of the course work, that is 50% of the overall grade and the maximum obtainable mark is 60%.

**GRADING:**

A+	=	90%	-	100%
A	=	80%	-	89%
B	=	70%	-	79%
C	=	60%	-	69%
R	=	Repeat		
X	=	A temporary grade, limited to situations with extenuating circumstances, giving a student additional time to complete the requirements of the course.		



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TEXTBOOK(S):

Highway Materials, Soils & Concretes, Harold N. Atkins

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
1	8	<u>Site Investigation</u> - sample recovery - bore hole logs - record keeping of field observations
2	25	<u>Laboratory Soils</u> - soil classification - mass volume measurements - grain size by sieve analysis - grain size by hydrometer analysis - Atterburg limits test - constant head permeability test - falling head permeability test - unconfined compression test - compaction test - determination of In-place soil density - California bearing ratio test
3	12	<u>Highway Construction</u> - sub-grade treatment - frost protection - aggregates and sub-grade preparation - earthwork operations - compaction equipment
4	15	<u>Movement of Water Through Soil</u> - permeability - Darcy's law of flow - flow nets - drainage



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COURSE OBJECTIVES

Site Investigation

1. Identify those topographical features of a site that indicate its subsoil properties.
2. Prepare a schedule of equipment for a typical subsoil investigation.
3. Schedule a procedure for carrying out such an investigation.
4. List the steps necessary to ensure satisfactory sample recovery.
5. Participate in a field crew investigating party.
6. Recover at least three bored samples in an "undisturbed" form, and three "disturbed" samples.
7. Submit a written report on the site exercise together with site plan and logs.

Soil Mechanics

1. Using the disturbed samples, determine the water content.
2. From an undisturbed sample, determine the Mass - volume measurement.
3. Using the disturbed samples, determine the soil classification.
4. Perform a grain size analysis by sieve.
5. Perform a hydrometer test for fines passing the 200 sieve.
6. Classify the in situ soils.
7. Determine the Atterburg limits for the sample soil.
8. Perform a constant head permeability test on at least two samples.
9. Perform an unconfined compression test on at least two undisturbed samples.
10. Solve basic soil problems using all of the above experimental findings.

Highway Construction

1. Identify the sub-grade materials, treatment of unsuitable material and compaction requirements.
2. State the conditions that must be present for frost damage to occur.
3. Identify the major components of a sub-grade structure.
4. Identify different types of earthmoving equipment.