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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: III

Date: SEPTEMBER 1987

Author: S. IENCO

New: _____ Revision: X

Approved: [Signature] Chairperson Sept 2/87 Date

SOIL MECHANICS AND HIGHWAY ENGINEERING

SUR 101-4

Course Name

Course Number

PHILOSOPHY/GOALS:

To introduce the student to basic soil properties and mechanics through a lab oriented approach. In addition the student will be introduced to highway layout and construction.

METHOD OF ASSESSMENT:

Labwork	40%
Assignments	10%
Mid Term Examination	20%
Final examination	30%
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	100%

A+	90% - 100%
A	80% - 89%
B	70% - 79%
C	55% - 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.

- 1) Minimum acceptable grade is 55%
- 2) Each lab assignment will carry equal weight.
- 3) Each assignment will carry equal weight.
- 4) If at the end of the semester your overall average of the combined labwork, 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 re-write. The criteria employed for arriving at that decision is class attendance, class participation and overall grade.
- 5) If a re-write is granted it will be given for the examination portion the course work, that is 50% of the overall grade and the maximum obtainable mark is 60%.

TEXT: Highway Materials, Soils & Concretes
Harold N. Atkins

ARC 231

TOPIC NO.	TOPIC DESCRIPTION
1.	<u>Site Investigation</u> <ul style="list-style-type: none">- Sample recovery- Bore hole logs- Record keeping of field observations
2.	<u>Laboratory Soils</u> <ul style="list-style-type: none">- Soil classification- Mass volume measurements- Grain size by sieve analysis- Grain size by hydrometer analysis- Atterburg limits test- Constant head permeability test- Unconfined compression test- Compaction test
3.	<u>Highway layout</u> <ul style="list-style-type: none">- Horizontal, circular and spiral curves- Super elevation theory- Profiles, plans and cross sections- Vertical curves- Plans and specifications
4.	<u>Highway construction</u> <ul style="list-style-type: none">- Drainage- Sub - grade treatment- Frost protection- Aggregates and sub grade preparation- Surfacing- Earthwork operations

COURSE OBJECTIVES

SOIL MECHANICS AND HIGHWAY ENGINEERING

ARC 231-3

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 Layout

1. Prepare a detailed cross -section drawing of a single and divided highway.
2. From a given map prepare a route plan for a highway.
3. Draw the longitudinal section for the highway.
4. Draw cross-sections 50m chainages throughout the length of the road.
5. Calculate the volumes of cut and fill.
6. From these computations reassess the formation levels for the road.

Highway Constructions

1. State factors affecting a site's run-off coefficient
2. Identify the subgrade materials, treatment of unsuitable material and compaction requirements.
3. State the conditions that must be present for frost damage to occur.
4. Identify the major components of a subgrade structure.
5. Identify different types of earthmoving equipment.