SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: CONSTRUCTION MATERIALS II

Code No.: ARC 134-3

Program: CIVIL/CONSTRUCTION

Semester: TWO

Date: JUNE 1985 Winter

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New:_____ Revision: X

APPROVED: L C Arnott 85/06/06

Chairperson Date

CONSTRUCTION MATERIALS II	ARC 134-3
Course Name	Course Number

PHILOSOPHY/GOALS:

The student should further develop an appreciation of the importance of quantifying the various properties of construction material and should always express an evaluation of such materials in a numerical form.

The student should further develop a commercial sense in appraising and evaluating construction materials.

The student should further develop the ability to work independently in a technical situation.

The student must learn to express technical data in a clear and concise form in both a verbal and written form.

METHOD OF ASSESSMENT (GRADING METHOD):

Laboratory Investigation

		Marks
1.	Modules of Elasticity for:	
	a) Timber in compression	5
	b) Concrete in compression	5
	c) Steel in tension	10
	d) Timber in bending	10
	e) Concrete in bending	10
	f) Steel in bending	10
2.	Plasticity Index	10
3.	Soil Density	10
4.	In-situ soil density - volumeasure	5
5.	Asphalt - penetration	5
6.	Asphalt - flash and fire	5

THOD OF ASSESSMENT....Continued

7.	Asphalt - softening point	5
8.	Asphalt ductility	5
9.	Asphalt viscosity	5
		100

TEXT:

Highway Materials, Soils and Concretes - Harold Atkins
- Reston

Asphalt Handbook - American Asphalt Institute

Asphalt Concrete Design - American Asphalt Institute

REFERENCE:

ASTM'S

Asphalt Handbook

CONSTRUCTION MATERIALS ARC 134-3

Topic No.	Periods	Topic Description
1	25	Strength of Materials -
		"E" for timber in compression "E" for concrete in compression Timber in bending Steel in bending Concrete in bending
2	14	Soil Mechanics -
		Earth's crust soil structure Grain analysis Moisture density relationship In-situ density - volumeasure
3	25	Asphalt Technology -
		Manufacture Material properties Mix selection Mix Design Marshal Method Mix Analysis

STRUCTION MATERIALS

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GENERAL OBJECTIVES:

1. The student should further develop an appreciation of the importance of quantifying the various properties of construction material and should always express an evaluation of such materials in a numerical form.

2. The student should further develop a commercial sense in appraising and evaluating construction materials.

3. The student should further develop the ability to work independently in a technical situation.

4. The student must learn to express technical data in a clear and concise form in both a verbal and written form.

SPECIFIC OBJECTIVES:

Unit 1 - Materials General

Using a universal test machine and the appropriate strain gauge, the modulus of elasticity must e determined for:

1/1 timber in compression
1/2 concrete in compression
1/3 steel in tension

From the simple beam formula and a given deflection formula, the ultimate tensile stress and the modulus of elasticity must be determined for:

1/4 timber
1/5 concrete
1/6 steel

Unit 2 - Asphalt Technology

2/1 The student must draw and label a flow diagram for the recovery of asphalt from crude oil.
2/2 The student must distinguish between an asphalt cement, liquid asphalt and emulsified asphalt.

Experimentally, and in accordance with the latest ASTM's, the student must determine the following:

2/3 The penetration value of two asphalt cements.

2/4 The flash and fire points for an asphalt cement.

2/5 The softening point for an asphalt cement.

2/6 The ductility value for an asphalt cement.

2/7 Experimentally verify viscosity value.

2/8 For a given traffic density, select an aggregate quality.

2/9 Determine the grading of the available aggregate, compute the necessary correction, adjust the g rade and experimentally verify the resulting sample.

2/10 Calculate, apportion and prepare all ingredients required for a Marshal test.

2/11 Using the Marshal apparatus, plot the stability and flow values for at least four values of vitumen content.

2/12 Determine the bulk density of the four samples.

2/13 From these results, recommend a mix design for the pavement.

2/14 Verify the bitument content of at least one concrete sample using the centrifuge.

2/15 Maintain a neat, comprehensive record of all laboratory work.

Unit 3 - Soils

3/1 Identify three classes of rock.

3/2 Establish the plasticity index of a soil.

3/3 Distinguish between the two main types of subsoil.

3/4 Determine the optimum moisture content for a compacted soil.

3/5 Determine the maximum dry density for a given subsoil.

3/6 Classify a given soil by means of a grain analysis.

CONSTRUCTION MATERIALS

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CRITERIA FOR ASSESSMENT OF GRADES

ITEM	% OF TOTAL GRADE ALLOCATION
Laboratory Investigation	
1. Modules of Elasticity for:	
a) Timber in compression	4
b) Concrete in compression	4
c) Steel in tension	4
d) Timber in bending	4
e) Concrete in bending	4
f) Steel in bending	4
2. Plasticity Index	10
3. Soil density - Moisture content	10
4. In-situ soil density - volumeasure	2
5. Asphalt - penetration	4
6. Asphalt - flash and fire	4
7. Asphalt - softening point	4
8. Asphalt ductility	4
9. Asphalt viscosity	4
10. Marshal test	15
11. Centrifuge test	3
Written Test	
12. Asphalt Technology	4
13. Gypsum and lime	4
14. Brickwork and Blockwood	4
Plastics	4
	100%