SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: Construction Materials

CODE NO.: ARC 133

PROGRAM: Architectural/Civil Technician

SEMESTER: II

AUTHOR: S. Ienco

DATE: January 1991

NEW: ________ REVISION: x

APPROVED: L. P. Crozzetti (CHAIRPERSON) DATE: 91/01/07

Construction Materials — ARC 133

COURSE NAME — CODE NO.

Total Credit Hours 64

Prerequisite (s) None

I. PHILOSOPHY/GOALS:

The student will be introduced to various construction materials such as soil, wood, steel and concrete. Understanding of the physical and engineering properties of these materials will be accomplished through lecture and in the laboratory experimentation. In addition, the student will design, construct, and test to ultimate failure a wooden truss.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will be able to:

1. Weigh and measure the physical properties of various construction materials employing standard laboratory equipment and procedures.

2. State and define the three phases of a soil mass and solve problems using the mass-volume relationship.

3. State the soil properties which identify a soil type and identify soils using the Unified Classification System.

4. Experimentally, determine the moisture content, Atterburg Limits, sieve analysis - dry and washed, and specific gravity of various soils.

5. Describe and explain the purpose of and the methods used in the standard and modified Proctor tests.

6. Differentiate between hardwoods and softwoods.

7. Describe the classification system for structural lumber.

8. List the advantages enjoyed by plywood over sawn lumber.

9. List the advantages in using glue laminated lumber.

Construction Materials | ARC 133

COURSE NAME | CODE NO.

II. STUDENT PERFORMANCE OBJECTIVES: (Continued)

10. Experimentally, determine the ultimate compressive strength of structural timber loaded parallel and perpendicular to the grain.

11. Experimentally, determine the modulus of elasticity of wood.

12. Identify the rolled steel sections found in the construction industry.

13. Experimentally, determine the ultimate strength of a structural steel bar.

14. Identify and differentiate between the five types of Portland cement currently in use today.

15. Specify the physical requirements of concrete aggregates.

16. Define the limits of acceptability of water for use in concrete production.

17. State and illustrate by graphical means, the age/strength relationship of normal Portland cement concrete.

18. From a job outline brief, produce a concrete mix design.

19. From a concrete mix design, develop a theoretical trial mix proportion.

20. Design, proportion, mix, form, cure and test at least three cylinders of normal Portland cement concrete at 7 and 28 days including making a slump and air entrainment test.

21. Define the site conditions necessary for both hot and cold wether concreting.

22. Research, design, draft and construct a wooden roof or bridge truss.

23. Design a laboratory system for bracing, loading and testing the truss to ultimate failure.

24. Produce a formal type written report on all phases of the truss project.

Construction Materials	ARC 133
COURSE NAME	CODE NO.

III. TOPIC DESCRIPTION

TOPIC NO.	TOPIC DESCRIPTION
1.	Introduction - Discussion of course outline, general objectives, evaluation methods, attendance requirements - Laboratory procedures
2.	Soils - Types - Mass-volume relationships - Grain size - Plasticity - Compaction
3.	Wood - Species - Structure - Sawing - Classification - Physical and mechanical properties - Plywood - Glue laminated products
4.	Structural Steel - Properties - Manufacture - Uses - Ultimate strength
5.	Portland Cement and Concretes - History - Aggregates - Water/cement ratio - Mix design - Batching - Placing - Additives - Curing and testing

Construction Materials — ARC 133

COURSE NAME — CODE NO.

IV. LABORATORY EXERCISES

TOPIC NO.	TOPIC DESCRIPTION
1.	GENERAL a) Mass volume relationships
2.	SOILS a) Sieve analysis b) Specific gravity test b) Atterbug limits test c) Compaction test
3.	STEEL a) Tensile test
4.	WOOD a) Compression parallel to grain b) Compression perpendicular to grain c) Stress strain relationship d) Measurement of moisture content and density
5.	CONCRETE a) Cement fineness b) Cement ultimate compressive strength c) Aggregate grading d) Mix design, manufacture and test
6.	PROJECT a) Truss design, construction and testing to ultimate failure

Note: The above list of laboratories may be revised to suit the particular needs of the class.

Construction Materials | ARC 133

COURSE NAME | CODE NO.

V. REQUIRED STUDENT RESOURCES (including textbooks and workbooks)

Highway Materials, Soils & Concretes
Latest Edition
Harold N. Atkins
Reston

VI. METHOD OF EVALUATION

A final grade will be derived from the results of three tests, and quizzes weighed as follows:

Laboratory work	30%
Project	10%
Three tests of equal weight	60%
TOTAL	100%

The grading system used will be as follows:

A+	90% - 100%
A	80% - 89%
B	70% - 79%
C	55% - 69%
R	Repeat

1) Minimum acceptable grade for this course is 55%.

2) Each laboratory will carry equal weight. Late submissions will be penalized with a loss of 20% for the first day late and an additional 10% for each subsequent late day.

3) If at the end of the semester your overall average of the combined laboratory work, project and examinations 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, which should be a least 45%.

4) In case a rewrite is granted, it will be permitted only once it will cover the entire course outline and will limit the maximum obtainable grade for the course to 60%.

5) Attendance is an absolute must for success in this course. Unless you have some legitimate excuse for missing a lecture, I will expect 100% attendance.