

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** CONSTRUCTION MATERIALS

**CODE NO. :** ARC 133                      **SEMESTER:** II

**PROGRAM:** CIVIL/CONSTRUCTION ENGINEERING

**AUTHOR:** S. IENCO

**DATE:** Dec-04              **PREVIOUS OUTLINE DATED:** Jan-04

**APPROVED:**

	_____	_____
	DEAN	DATE

**TOTAL CREDITS:** 4

**PREREQUISITE(S):** NONE

**LENGTH OF COURSE:** 16 WEEKS              **TOTAL CREDIT HOURS:** 64

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*For additional information, please contact C. Kirkwood, Dean  
School of Technology, Skilled Trades & Natural Resources  
(705) 759-2554, Ext.688*

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Course Name

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Code No.**I. COURSE DESCRIPTION:**

You will be introduced to various construction materials such as aggregates, asphalt concrete and Portland cement concrete. Understanding of the physical and engineering properties of these materials is accomplished by way of lectures, laboratory testing and field trips.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. List the types of soil and rock deposits used for aggregates in Ontario and in local areas, and estimate types and potential quantities of material contained in a deposit.

Potential Elements of the Performance:

- State, define and describe the origin, formation, sources and properties of aggregates
- Describe typical aggregate bearing landforms.
- Identify current applicable standards pertaining to aggregate properties for various construction uses.

2. Identify standards for sampling and testing aggregates and perform aggregate tests.

Potential Elements of the Performance:

- Describe the procedures for extracting representative samples of aggregates from conveyors, stockpiles, trucks, barges, bins and pit faces in accordance to recommended practices and using common sampling techniques.
- Determine the size of sample required for any test to be performed on the aggregate.
- Perform standard tests such as sieve analysis, grain size distribution, wash test, relative density and absorption (coarse aggregate), relative density and absorption (fine aggregate) and soundness test.
- Assess test results, perform calculations and prepare laboratory reports.

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Code No.

3. Design and test asphalt concrete mixes using the Marshall method and industrial standards and specifications.

Potential Elements of the Performance:

- Identify the types and uses of asphalt cements.
  - Identify required asphalt cement tests.
  - Perform a sample split.
  - Produce briquettes for testing.
  - Conduct asphalt tests for air content, density and stability.
  - Assess test results, perform calculations and prepare laboratory reports
  - Maintenance of Asphalt Pavement – Inspection of causes and repair of cracks, distortions, disintegration and slippery surfaces
4. Design and test Portland cement concrete mixes to satisfy design criteria such as water/cement ratio, aggregate blending, admixture selection and trial batch procedures.

Potential Elements of the Performance:

- Describe the manufacture of Portland cements, the types produced and their uses in construction.
- Describe Portland cement concrete including materials used, the hydration process, water/cement ratio, curing requirements, workability, air content, admixtures and criteria used to measure properties.
- Recognize methods used to improve durability of Portland cement concrete when exposed to freeze/thaw cycles, road deicing chemicals and other destructive environments.
- Prepare a Portland cement concrete mix, sample and test for slump, air content and density.
- Cast fresh concrete cylinders.
- Complete compression testing of standard cured concrete including capping, breaking, recording, plotting and evaluating results.
- Describe practices used in the mixing, transportation, placing and finishing concrete on construction projects.

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**III. TOPICS:**

1. Aggregate Sources
2. Aggregate Sampling and Testing
3. Asphalt Concrete
4. Portland Cement Concrete

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:****Highway Materials, Soils, and Concretes**

Latest Edition

Harold Atkins

**V.****EVALUATION PROCESS/GRADING SYSTEM:**

You will be assigned a final grade based on successful completion of laboratories, assignments and tests, weighted as follows:

Laboratories/Assignments	30%
Project	10%
Two tests of equal weight	<u>60%</u>
<b>TOTAL</b>	<b>100%</b>

Each laboratory and assignment carries equal weight. Late submittals receive only a maximum grade of 50%. However, laboratories or assignments handed in later than one week will receive a grade of 0%.

An average of 50% on laboratories/assignments and 50% on tests is required for successful completion of this course.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 - 59%	1.00

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F (Fail)	49% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

## VI. SPECIAL NOTES:

### Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1101 or call Extension 703 so that support services can be arranged for you.

### Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

### Plagiarism

Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course, as may be decided by the professor. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

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Substitute course information is available in the Registrar's office.

### Testing Absence

If a student is unable to write a test on the date assigned, the following procedure is required:

- The student shall provide the Professor with advance notice preferably in writing of his/her need to miss the test.
- The student may be required to document the absence at the discretion of the Professor.
- All decisions regarding whether tests shall be re-scheduled will be at the discretion of the Professor.
- The student is responsible to make arrangements, immediately upon return to the College with his/her course Professor related to make-up of the missed test prior to the next scheduled class for the course in question.
- In the event of an emergency on the day of the test, the student may require documentation to support the absence and must telephone the College to identify the absence. The college has a 24 hour electronic voice mail system (759-2554 Ext. 600)

### **VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam and/or portfolio.

### **VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.