

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** FOREST MENSURATION

**CODE NO. :** NRT119 **SEMESTER:** 1

**PROGRAM:** FORESTRY TECHNICIAN

**AUTHOR:** BOB CURRELL

**DATE:** Aug 2005 **PREVIOUS OUTLINE DATED:** JUNE 2004

**APPROVED:**

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**DEAN**

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**DATE**

**TOTAL CREDITS:** 3

**PREREQUISITE(S):** NONE

**HOURS/WEEK:** 3

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*School of Technology, Skilled Trades & Natural Resources*  
*(705) 759-2554, Ext.688*

**I. COURSE DESCRIPTION:**

This is a foundational course which introduces students to the techniques and instruments used in forest inventory field measurements. Background theory is reinforced with a great deal of outdoor practice in measuring tree diameters, heights and ages. The wedge prism, Normal Yield Tables and Ontario's forest Resource Inventory are introduced. Acquired forest measurement skills in this course will have direct application in many other forestry courses.

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

(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

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

**1) Complete accurate, clear and legible field notes**

Potential Elements of the Performance:

- fully complete area identification information headings on tally sheets and maps
- record inventoried trees by species and diameter class using a dot tally
- record all tally information clearly and completely

This learning outcome will constitute 5% of the course grade

**2) Measure, classify and record tree diameters using accepted equipment and techniques.**

Potential Elements of the Performance:

- explain the reasons for measuring tree diameters
- show the standard location (breast height) where diameter measurements are made on trees exhibiting different stem characteristics
- assign trees to different diameter classes given actual diameter measurements to 0.1 cm. Accuracy
- calculate basal area of trees given their diameters
- measure the diameters of trees to 95% accuracy using diameter tapes and parallel calipers

This learning outcome will constitute 20% of the course grade.

**3) Measure and record tree heights**

Potential Elements of the Performance:

- show and describe five different height measurements it is common to make on forest trees
- describe five methods of measuring tree height
- calculate tree heights from measurements using hypsometers equipped with different scales; degree, per cent, 15, 10
- measure tree heights to 95% accuracy using a Suunto clinometer
- measure tree height to 95 % accuracy using a height pole
- construct and use a staff hypsometer to measure tree height to 92.5 % accuracy

This learning outcome will represent 20% of the course mark.

**4) Measure the age of trees and explain the importance of these measurements**

- illustrate how a tree grows in height and age over a number of years
- distinguish between annual rings of conifers and 2 types of hardwoods
- determine the age of conifers to 95 % accuracy using an increment borer
- list and describe the applications of tree aging
- describe dendrochronology and explain its applications

This learning outcome will represent 15% of the course grade.

**5) Measure the Basal Area of Individual Trees and Entire Forest Stands**

- determine the basal area of a tree of a known diameter
- describe the importance of basal area/ hectare information
- show the principle of calculating basal area through the use of angle gauges
- list the types of equipment which can be used to measure basal area per hectare
- demonstrate proficiency in the use of a wedge prism
- determine the basal area of sample plots to 95% accuracy

This learning outcome will represent 15% of the course total

**6) Understand the Forest Resource Inventory system of measuring and recording forest information**

## Potential Elements of the Performance

- describe the components of an FRI survey
- list the types of information collected in FRI ground plots and show the measurement error tolerances for each measurement
- calculate the basal area by species and the species composition of a forest area if you are given FRI ground plot tally information
- identify the area covered by an FRI map, based on its basemap reference number
- locate a spot on an FRI basemap, if given its complete UTM reference number
- prepare the stand number for an FRI forest stand, if given the UTM coordinates of its centre
- decode an FRI stand description as it appears on an FRI map or Stand Data Table
- prepare a complete FRI Stand Table notation if provided with FRI ground plot information for that area

This learning outcome will represent 20% of the course's grade

**7) Maintain and properly care for tree measurement equipment**

- wind and unwind a 30 m and/or 50 m tape onto a spool
- carry height poles, hypsometers, increment borers, diameter tapes and other equipment in order to avoid equipment damage
- Know how to sharpen and maintain an increment borer

This learning outcome will represent 5% of the course total. Up to 5% will be deducted for documented mis-use or loss of equipment.

**III. TOPICS:**

- 1) Introduction to Forest Measurements
- 2) Completing field notes
  - using the dot tally system
  - completing area identification information

- 3) Measuring Tree diameter
  - reasons for measuring tree diameter
  - location where tree diameter is measured on trees exhibiting different stem characteristics and slope positions
  - how to measure tree diameter, tree diameter classes
  - concept of Basal Area introduced
  - measuring tree diameters with diameter tapes, callipers, 30 m. tapes
  
- 4) Measuring Tree Height
  - types of tree height measurements commonly obtained
  - methods of measuring tree height
  - calculating tree heights using readings obtained from a variety of clinometers
  - use of the Degree scale, % scale, 15 and 20 scales
  - calculating horizontal distances from slope distance information
  - measuring tree heights using Suunto, Haga, and staff hypsometers
  - an introduction to electronic clinometers
  
- 5) Tree Ages
  - how trees grow in height and age
  - identifying annual growth rings in different species classes of trees
  - tree aging techniques
  - measuring tree age using increment borers
  - care and use of increment borers and increment cores
  - applications of tree aging
  - dendrochronology
  
- 6) Measuring Forest Density
  - measurement of forest basal area
  - uses of basal area information
  - theory of angle gauges
  - measuring basal area with a wedge prism
  - using your thumb as an angle gauge
  
- 7) Forest Resource Inventory
  - how an FRI inventory is carried out
  - information collection in FRI ground plots
  - measuring FRI ground plots
  - allowable error for FRI cruise data
  - reading FRI maps

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Forest Mensuration Study Guide; 2005 edition  
 Silva Ranger or Suunto MC-1 compass  
 Calculator

Computer access to Web CT course OEL 816 (Forest Mensuration Theory)

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

Tests (2)	50%
Assignments and quizzes	50%

There will be weekly field exercises and/or short written assignments. Field exercises include a tree height and diameter test which must be successfully completed to pass the 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%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
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:**

This course will use the Web CT course OEL 816 (Forest Mensuration Theory) as an educational resource. Students will be expected to access this course frequently for additional information and occasional assignments.

**Special Needs:**

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 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 post-secondary 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/program, as may be decided by the professor/dean. 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.

**Course outline amendments:**

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.

Substitute Course Information is available at the Registrar’s Office.

Field exercises will not be assigned other than at the scheduled class time. Students missing assignments will receive a mark of 0 for that activity.

Optional non-graded forest management activities may be offered, off campus, on occasional weekends. Volunteers will be accepted on a first come, first served basis.

**Late Assignments**

There will be a 10%/day penalty for assignments received late (after 4:00 pm. on the due date)

**VII. PRIOR LEARNING ASSESSMENT**

Students who wish to apply for advanced credit in the course should consult the professor. Credit

**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.