

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON



COURSE OUTLINE

COURSE TITLE: FOREST MENSURATION

CODE NO.: NRT 119 SEMESTER: 1

**PROGRAMS: FORESTRY TECHNICIAN, ABORIGINAL
RESOURCE TECHNICIAN**

AUTHOR: BOB CURRELL

DATE: JAN 2002 PREVIOUS OUTLINE DATED: June 2001

APPROVED: _____
DEAN DATE

TOTAL CREDITS 3 PREREQUISITE(S): NONE

LENGTH OF COURSE: 3 HRS/WEEK X 16 WEEKS

TOTAL CREDIT HOURS: 48

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For additional information, please contact Brian Punch, Acting Dean, School of Business, Hospitality & 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:

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

This learning outcome will constitute 10% 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
- explain the use of diameter tapes and parallel callipers to measure tree diameter
- use a standard measuring tape to measure tree diameter
- measure the diameters of trees to 95% accuracy using diameter tapes and parallel callipers

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, 20
- measure tree heights to 95% accuracy using a Suunto clinometer
- construct and use a staff hypsometer to measure tree height to 92.5 % accuracy

This learning outcome will represent 25% of the course mark.

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

Potential Elements of the Performance:

- 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
- explain how to carry out destructive and non-destructive sampling of tree age
- identify common problems that may occur when increment boring trees and explain how to minimize these problems
- determine the age of conifers to 95 % accuracy using an increment borer
- list and describe at least four applications of tree aging
- describe dendro-chronology 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

Potential Elements of the Performance:

- determine the basal area of a tree of a known diameter
- calculate the basal area of trees per hectare if given appropriate inventory information
- show the principle of calculating basal area through the use of angle gauges
- explain how to correctly use a wedge prism to measure basal area
- estimate the basal area of a forest sample using your thumb as an angle gauge

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 15% 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 to avoid damage
- how to sharpen and maintain an increment borer

Up to 5% may 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
- dendro-chronology

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; 2001 edition
Silva Ranger or Suunto MC-1 compass

Internet access and a computer account at Sault College in order to access:

Web CT course OEL816 (Forest Mensuration Theory). All students enrolled in NRT119 have also been given access to the Web CT course OEL816 Forest Mensuration Theory. N.B. This is a valuable addition to your course materials but not essential.

Availability of the following additional equipment is optional but will allow practice in the measurements described.

- Suunto or Haga hypsometer
- 30 m. tape
- Diameter tape or parallel callipers
- Increment borer

V. EVALUATION PROCESS/GRADING SYSTEM

Tests (2) 40%

Assignments

And quizzes 60%

On-line Assignments 30%

1. Assignment 1-1 from the Study Guide
2. Assignment 2-1 from the Study Guide or Assignment 1 from OEL816
3. Assignment 2-2 from the Study Guide
4. Assignment 3-1 from the Study Guide
5. Assignment 3-2 from the Study Guide or Assignment 3 from OEL816
6. Assignment 5-1 from the Study Guide

Field exercises during March field week at Sault College – 30%

1. Measurement of hardwood heights and diameters
2. Measurement of conifer tree heights and diameters.

3. Measurement of tree age.

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 as explained in Section V. Successful completion of the course will not be affected if an Internet connection is not available. Paper copies of assignments from course OEL816 will be provided upon request, but only before the assignment due dates.

Distance Education Students must complete a 2 day field session during their time at Sault College in the winter semester to evaluate their forest measurement skills..

- **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.
- **Course Modification**
The instructor reserves the right to modify the course as deemed necessary to meet the needs of students.
- **Disclaimer for Meeting the Needs of the Learners**
- **Substitute Course Information is available at the Registrar's Office.**

Assignments.

All assignments must be submitted to pass the course. there will be a 5%/day penalty for assignments received late.

VII. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the

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following: