GRANDE PRAIRIE REGIONAL COLLEGE

DEPARTMENT OF SCIENCE AND TECHNOLOGY

Bachelor of Applied Forest Resource Management

FOREST MENSURATION I: FO2370

Transfer status: Under discussion

Pre-requisite: ST 1510 (Introduction to applied statistics)

Calender Description:
Sequential treatment of the collection of forest data. Design of a survey, location of points on the ground. The theory behind basic mensuration equipment and how to use it. How to make simple instruments to estimate tree height and DBH. Collection and compilation of data. Analysis of collected data. Development of volume tables, scaling, grading. Using the Global Positioning System (GPS). Measurement of other forest values, e.g. wildlife, recreation.

Instructor: Albert Sproule
Office: C203
Phone: 539-2061
Email: sproule@gprc.ab.ca

Lectures: Tuesdays and Thursdays 9.30 - 10.50 D213
Lab: Thursdays Field - then M134

Course Description:
Forest mensuration is defined (Young and Giese, 1990) as "the science dealing with the measurement of volume, growth and development of individual trees and stands and the determination of various products obtainable from them". The 'various products' refers to fibre products and also to other forest values such as recreation, wildlife.
Our initial discussions will cover the purpose of forest mensuration, i.e. why do we need to measure and assess our forests? This discussion will lead us into the concept of the Annual Allowable Cut (AAC). Also, in the concept of modern forestry, it will lead us to consideration of other values of the forest resource such as wildlife and recreation.
From the philosophical consideration of the "why of forest mensuration" we will move to the more practical consideration of "how is it done". We will look at the different aspects of forest mensuration by considering the steps a forester would follow to obtain information on the volume and growth of the forest.
The following are some of the steps he/she would consider in setting up an inventory survey, i.e. a timber cruise:

- Temporary versus permanent sample plots.
- Sampling intensities and stratified sampling.
- Laying out a cruise on a map or aerial photograph.
- Directional and measurement instruments needed.
- What information to collect.
- Contacting other Departments/Sections re collection of information.

- Collecting 'other than fibre' information.
- Running the cruise in the field, using different measurement equipment
- Recording information in the field, tally cards and data-loggers
- Analysis of the collected data

We will consider how cruise results can be used to develop growth and yield, and volume tables and how they can be used in mapping the forest.
The foregoing might be considered as 'pre-harvest' data collection and analysis.
In the 'post-harvest' situation we will look at scaling and grading of harvested timber.
As part of our course we will discuss the basic theory underlying the various mensuration instruments and we will see how, if we had to, we could ourselves design simple instruments to take measurements such as tree height, and diameter at breast height (DBH).

TEXTS AND REFERENCES

RECOMMENDED FOR PURCHASE

Smith, D.M., Larson, B.C., Kelty, M.J. and P.M.S. Ashton. (1997). The Practice of Silviculture - Applied Forest Ecology. John Wiley & Sons, Inc. Toronto. 537 pp.

TEXTS AVAILABLE IN THE LIBRARY

Avery, T.A. and H.E. Burkhardt. (1994). Forest Measurements. 4th Ed. McGraw-Hill, New York. 408 pp.
Husch, B., Miller, C.I. and T.W Beers. (1993). Forest Mensuration. Krieger Publishing Company, Malabar, Florida. 402 pp.
Compendium of Canadian Forestry Statistics. (1996). Canadian Council of Forest Ministers.

SCIENTIFIC JOURNALS AND PERIODICALS AVAILABLE IN THE LIBRARY

Canadian Journal of Forest Research
Forestry Chronicle
Northern Journal of Applied Forestry
Silviculture

WEBSITE

www.canadian-forests.com; www.fs.fed.us

EXAMINATIONS AND MARK ALLOCATION

Mid-term examination	30%
Mid-term lab exam	15%
Final lab exam	10%
Lab report	5%
Final examination	40%

LECTURE SCHEDULE

Introduction to Forest Mensuration — **4 lectures**

- what is forest mensuration?
- occasions when we need measurements from the forest
- one-time measurements vs repeated measurements
- principles and units of measurement
- variables, precision and accuracy

Field Measurements, Methods and Instruments — **3 lectures**

- linear measurement
- areal measurement

Forest Inventory Surveys (timber cruises)

- information required from a cruise — **1 lecture**
- collecting information for other sections/agencies — **1 lecture**
- design and layout of a cruise — **2 lectures**
- temporary vs permanent sample plots — **1 lecture**
- horizontal point sampling vs monareal plots — **2 lecture**
- instruments needed for a cruise — **2 lectures**
- theoretical basis of the compass, height instruments, DBH instruments — **3 lectures**
- recording information in the field, tally cards, data-loggers — **2 lectures**
- data entry to computer — **1 lecture**
- analysis of data — **2 lectures**

Aerial Photographs in Forest Inventory — **2 lectures**

Foreest Inventory in Alberta, Phase III and AVI — **1 lecture**

Analysis of Tree and Stand Growth — **4 lectures**

Stand Structure, Site Quality — **3 lectures**

Log Rules and Volume Tables — **3 lectures**

Grading — **1 lecture**

Weight Measurement — **1 lecture**

Designing Simple Instruments

- how we can collect acceptable information in the absence of sophisticated modern equipment — **2 lectures**

Other Mensuration Information — **2 lectures**

- estimating wildlife populations
- recreational use estimation

LAB SCHEDULE

Lab I — **Introduction to Forest Surveys**
- transects
- monareal plots
- horizontal point sampling (angle guage)
- temporary vs permanent sample plots

Lab II — **Basic Mensuration Equipment**
- distance Measurements
- compassing
- tree diameter measurements
- tree heights

Lab III — **Running an Inventory Survey (Timber Cruise)**
- what information to collect?
- what instruments and equipment are needed?
- laying out the cruise line

Lab IV — **Running the Cruise Line**
- monareal plots

Lab V — **Running the Cruise Line**
- horizontal point sampling

Lab VI — **Mid-term lab exam**

Lab VII — **Analysis of Cruise Information**
- mapping the forest

Lab VIII — **Analysis of Cruise Information**
- growth and yield tables from permanent sample plot data

Lab IX — **A special Type of Cruise**
- the regeneration survey

Lab X — **Making Simple Mensuration Equipment**
- diameter tapes
- the Biltmore stick
- hypsometers

Lab XI — **Scaling and Grading**

Lab XII — **Aerial Photographs**

Lab XIII — **Final Lab Exam; Hand in Lab Reports**

Note: Students are expected to keep full notes and records of all lab activities. These will be taken in and graded at the end of term.