

JAN 28 2000

**GRANDE PRAIRIE REGIONAL COLLEGE**  
**DEPARTMENT OF SCIENCE AND TECHNOLOGY**

**Bachelor of Applied Forest Resource Management**

**FOREST MENSURATION II: FO4280**

**Transfer status:** Under discussion

**Pre-requisite:** FO 2370 (Mensuration I)

**Calendar Description:**

Theory and use of instruments. Measurement of timber and non-timber forest resources. Forest inventory methods. Sampling technique and design.

**Instructor:** Albert Sproule  
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**Lectures:** Monday and Wednesday: 10:00 – 11:20 A304

**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 course will deal with the methodology of data collection during a mensuration exercise, i.e. an inventory or timber cruise. Also, in the concept of present-day forestry, it will lead us to consideration of inventories of other forest resources such as wildlife and recreation.

We will study the planning of forest inventories and the different sampling techniques and designs used in collecting inventory data:

- Purpose of the inventory.
- Informing other departments/agencies/institutions of the intended exercise.
- Theoretical basis and use of forest instruments.
- Review of the concept of sampling and sampling terminology.
- Temporary versus permanent sample plots.
- Acceptable levels of error in collected data.
- Sample design:
  - Probability sampling
    - random sampling
    - stratified random sampling
    - multistage sampling
    - multiphase, including 'double' sampling
  - Non-random sampling

- selective sampling
- systematic sampling
- Estimation of required plot numbers and plot sizes.
- Precision and accuracy.
- Statistical implications of probability versus non-random sampling.
- Sampling with replacement versus sampling with no replacement.
- Point sampling versus fixed area sampling.

Traditionally, inventories of non-timber forest values have not received as much attention as inventories of fibre values. In part this was because they were not regarded as important and in part was probably also due to the difficulty of conducting an inventory and attaching actual monetary values to the results. We will consider the measurement of:

- rangeland resources
- fish and wildlife resources
- water resources and
- recreational resources

Throughout the course students will be kept apprised of the various mensurational strategies and methodologies currently used in the forest industry.

### **TEXTS AND REFERENCES**

#### **RECOMMENDED**

Avery, T.A. and H.E. Burkhardt. (1994). Forest Measurements. 4<sup>th</sup> Ed. McGraw-Hill, New York. 408 pp.

#### **TEXTS AVAILABLE IN THE LIBRARY**

Avery, T.A. and H.E. Burkhardt. (1994). Forest Measurements. 4<sup>th</sup> 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.

Cochran, W.G. (1977). Sampling Techniques. John Wiley & Sons, New York.

Compendium of Canadian Forestry Statistics. (1996). Canadian Council of Forest Ministers.

Freese, F. (1962). Elementary Forest Sampling. U.S. Dept. Agric. Handbook # 232.

#### **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](http://www.canadian-forests.com); [www.fs.fed.us](http://www.fs.fed.us)

### **EXAMINATIONS AND MARK ALLOCATION**

Mid-term examination	30%
assignments, reports, quizzes	35%
Final examination	35%

## LECTURE SCHEDULE

### Forest Inventory Surveys (timber cruises)

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

### Aerial photographs

- basic principles, cameras, filters, scale, focal length, 1 lecture
- stereoscopic vision
- Determining tree height from single photo or stereo pair 2 lectures
- Mapping, planimetric and topographic 1 lecture
- Applications in forestry, species identification, cover-type mapping, volume estimation 1 lecture

### Other information-gathering systems,

- satellite imagery, multi-spectral scanning 1 lecture

### Sampling

- introduction and terminology 2 lectures
- levels of acceptable error in collected data
- temporary plots versus permanent plots
- Probability sampling
  - random
  - stratified random
  - multistage
  - multiphase
- Non-random
  - selective 3 lectures
  - systematic (regen survey as an example)
- Estimating required plot size and plot numbers 2 lectures
- Point sampling 1 lecture

### Applications

Inventory strategies and techniques currently used in the forest industry 1 lecture

### Non-fibre resources

- rangeland 4 lectures
- watershed
- fish and wildlife
- recreation