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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)

Calender Description:
Measurement of timber and non-timber forest resources. Forest inventory methods. Sampling technique and design. Development and use of growth and yield models. Analytical methods in forest mensuration.

Instructor: Albert Sproule
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Lectures: Wednesday 15:00 - 16:30

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.
- 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

Collected data may simply be scrutinised and assessed by means of descriptive statistics. More typically however, it would be analysed by means of:
Analysis of variance
Analysis of covariance
Regression techniques.

The latter part of the course will involve studying growth and yield and developing tree and stand volume equations. This will require study of the following concepts:

- calculation of site index values
- study of stand density and stocking
- comparing tree growth versus stand growth.
- developing models to predict tree and stand growth.
- developing models to predict the effects of disease or insect damage
- how to select appropriate models for specific purposes.
- use of linear regression in deriving tree and stand volume equations
- evaluation and fitting of multiple linear regression models.

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. 4th Ed. McGraw-Hill, New York. 408 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.

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; www.fs.fed.us

EXAMINATIONS AND MARK ALLOCATION

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

LECTURE SCHEDULE*

Purpose of forest inventory — **1 lecture**
- informing other departments etc.

Sampling — **6 lectures**
- introduction and terminology
- levels of acceptable error in collected data
- temporary plots versus permanent plots

Probability sampling
  random
  stratified random
  multistage
  multiphase

Non-random — **3 lectures**
  selective
  systematic (regen survey as an example)

Estimating required plot size and plot numbers — **2 lectures**

Point sampling — **1 lecture**

Applications — **2 lectures**
Inventory strategies and techniques currently used in the forest industry

Non-fibre resources — **4 lectures**
- rangeland
- watershed
- fish and wildlife
- recreation

Analysis of collected data — **3 lectures**

Tree and stand growth and yield — **6 lectures**
general concepts

Modelling — **13 lectures**
tree and stand growth and yield and volume equations

Applications — **2 lectures**
Examples of modelling strategies and techniques currently used in the forest industry

* **A lecture period is considered as a one-hour contact period with students. For example, the 21 lecture hours allotted to the final three course topics represent 21 contact hours.**