

GRANDE PRAIRIE REGIONAL COLLEGE

Bachelor of Applied Forest Resource Management

FOREST MENSURATION I: FO2370

SEP 10 2002

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

Calendar 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). Aerial photographs, their interpretation and use in cover-type mapping, volume estimation etc. Measurement of other forest values, e.g. wildlife, recreation.

Instructor: Jennifer Hacking
Office: C408
Phone: 539-2873
Email: jhacking@gprc.ab.ca

Lectures:	Tuesdays and Thursdays 10:00 – 11:20	B304
Lab:	Thursdays 2:30 – 5:20	B305

Recommended Text:

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

References available in Library:

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.
Lillesand, T.M. and R.W. Kiefer. (1994) Remote Sensing and Image Interpretation. John Wiley & Sons, Toronto.
Paine, D.P. (1981). Aerial Photography and Image Interpretation for Resource Management. John Wiley & Sons, Toronto.
Philip, M.S. (1998) Measuring Trees and Forests. CABI Publishing, New York. 310 pp.

Scientific Journals and Periodicals available in the Library:

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

Evaluation:

Mid-term examination	25%
Mid-term lab exam	15%
Assignments & lab reports	20%
Final examination	40%

Lecture Schedule

Introduction to Forest Mensuration	week 1
<ul style="list-style-type: none">➤ 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	
<ul style="list-style-type: none">➤ linear measurement➤ area measurement	
Mapping systems	week 2
<ul style="list-style-type: none">➤ latitude and longitude; township and range; UTM grid	
Forest Inventory Surveys (timber cruises)	week 3
<ul style="list-style-type: none">➤ information required from a cruise, collecting information for other sections/agencies, including wildlife and recreation➤ design and layout of a cruise, temporary vs permanent sample plotsLocation of pre-set starting point or relocation of previously-run line➤ horizontal point sampling, monareal plots, polyareal plotsinstruments needed for a cruise➤ theoretical basis of the compass, hypsometers, dendrometers➤ GPS, principles and use➤ recording information in the fieldtally cards, data-loggers➤ data entry to computer, analysis of data	
Analysis of Tree and Stand Growth, Stand growth projection	week 4
Growth modelling	week 5
<ul style="list-style-type: none">➤ basics of modelling, information in – answers out➤ types of model, advantages and disadvantages	week 6
Scaling, grading and weight measurement	week 7
Aerial photographs	weeks 8, 9
<ul style="list-style-type: none">➤ Basic principles, cameras, filters, film type.Focal length – relationship to altitude and scale.Overlap of stereo pairs and between flight lines➤ stereoscopic vision, preparing photos and using the stereoscope➤ Displacement due to relief<ul style="list-style-type: none">○ Determining tree height from single photo○ Determining tree height by Parallax Wedge➤ Other measures from photos: VCD, crown density➤ Mosaics and orthophotos, what are they? how do we use them?➤ Applications of aerial photographs in forestry	week 10
species identification, cover-type mapping, volume estimation	week 11
➤ Making maps from photographs	week 11/12
<ul style="list-style-type: none">○ planimetric and topographic○ transferring detail from photograph to map	
Other information-gathering systems,	week 13
<ul style="list-style-type: none">➤ satellite imagery, multi-spectral scanning, video	week 14
	week 15

LAB SCHEDULE

- Lab 1** **Preparing for a survey in Economy Creek Forest**
- Identifying the productive area
 - Identifying stands to be surveyed.
 - What information to collect.
 - Survey methodology, plot size and shape.
 - Plot allocation
 - The tally card and instruments needed.
- Lab 2** **Conducting the survey at Economy Creek**
- Lab 3** **Conducting the survey at Economy Creek**
- Lab 4** **Data entry and volume calculations from lab2 and lab 3**
- Lab 5** **Calculating the area of surveyed stands**
- The dot grid
 - The rolling-ball planimeter
- Lab 6** **Stem analysis**
- Selecting the tree
 - Marking, felling and sectioning
- Lab 7** **Site quality**
- Derivation and use of site index curves
- Lab 8** **GPS (global positioning system)**
- use in different situations (open ground, open pine, closed canopy spruce)
 - for each stand type record PDOP, SNR, satellite health and accuracy
 - compare results for each stand type – explain
- Lab 9** **Stand growth projections**
- problem solving
- Lab 10** **Aspects of aerial photography**
- solving mathematical problems to emphasise the relationship between scale, altitude, PSR, MSR
- Lab 11** **Aerial photographs**
- preparing the stereo pair for examination
principle points, conjugate points, line-of-flight
 - using 'displacement due to relief' to estimate tree height from a single photograph
 - using the parallax wedge to estimate tree height from the stereo pair
- Lab 12** **Radial line triangulation**
- A technique for transferring information (e.g. a newly-constructed road) from photo to map.
- Lab 13** **Aerial photographs**
- Interpretation of cover-type, stand delineation from the photo
 - Ground truthing in the field
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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.