

Discipline: Agriculture	Sub-discipline: Forestry/Natural Resources
General Course Title: Forest Measurements	Min. Units: 3 Semester
Proposed Suffix: L	
<p>Course Description:</p> <p>This course is an introduction to the sampling methods and equipment used to inventory forest resources. Log scaling and aerial photo interpretation will also be discussed. Measurements of timber stand growth, quantity and quality, and other forest products including water, range, wildlife and outdoor recreation will also be covered. Laboratory required.</p>	
Required Prerequisites or Co-Requisites ¹	
Advisories/Recommended Preparation ²	
<p>Course Objectives: <i>At the conclusion of this course, the student should be able to:</i></p> <ul style="list-style-type: none"> • Discuss the objectives and goals of a forest inventory project. • Apply fundamental measurement and statistical methods to the mensuration of a variety of ecosystem components. • Measure and record data from a forest setting using state-of-the-art technologies utilized in the forest industry as well as simple measurement devices. • Select and apply appropriate problem solving techniques to specific measurement situations. • Collect and analyze data on the growth and yield of forest products over time. • Select appropriate software and measurement tools to perform forest inventory, cruising, and scaling in an efficient manner and according to industry standards. • Download GPS (Global Positioning System) data from recorder to PC to generate map and data tables. • Manipulate stand data using modeling software. • Apply various field-sampling methods. • Cruise standing timber and determine the quantity and quality of wood. • Scale logs for the board foot volume based on mathematical formulations. • Delineate timber types, cultural features and areas using stereoscopic aerial photography. • Identify commercial species of logs by bark and wood characteristics. • Assess the damage to wood volumes from insect, fire, suppressed conditions, and human factors, and estimate the financial loss. • Apply measurement techniques to other ecosystem components including water, vegetation, wildlife, and recreation systems. 	
<p>Course Content:</p> <ol style="list-style-type: none"> 1. Forest Inventory <ol style="list-style-type: none"> a. Goals and objectives b. Scope of forest measurements c. Theory of forest measurements d. Units of measure d. US vs. metric f. Volumes g. Area determination 	
<p>Forest Measurements (Content Continued)</p>	

¹ Prerequisite or co-requisite course need to be validated at the CCC level in accordance with Title 5 regulations; co-requisites for CCCs are the linked courses that must be taken at the same time as the primary or target course.

² Advisories or recommended preparation will not require validation but are recommendations to be considered by the student prior to enrolling.

2. Forest Measurements
 - a. Scope of forest measurements
 - b. Theory of forest measurements
 - c. Units of measure
 - d. U.S. vs. metric
 - e. Volumes
 - f. Area determination

3. Measurement Analysis Tools and Technologies
 - a. Tools
 1. Field data collectors
 2. Hypsometers
 3. Loggers tapes
 4. Prisms
 5. Clinometers
 6. Relaskops
 7. Hand held distance lasers
 8. Cruisers sticks
 9. Scaling sticks
 10. Hand compass
 11. Planimeters
 - b. Technologies
 1. Programmable hand held data collectors
 2. Hand held GPS units
 3. Laser range finders
 4. Stereoscopes
 5. Basic forest modeling software
 6. Increment borers
 7. Compensating polar planimeters

**Forest Measurements
(Content Continued)**

4. Timber Cruising

- a. Identification of species
 - b. Measurement of Trees
 - 1. Inventory Equipment
 - 2. Utilization Standards
 - 3. Height and Diameter Measurements
 - 4. Gross Volume Determination
 - c. Grading of logs
 - 1. Recognition of Defect Types
 - 2. Cull Allowance for Defects
 - 3. Log Grade Estimation
 - 4. Net Tree Volume Determination
 - d. Types of Cruises
 - 1. Strip Cruising
 - 2. Plot Cruising
 - 3. Variable Plot Cruising
 - e. Volume tables
 - 1. Local Volume Tables
 - 2. Standard Volume Tables
 - 3. Form Class Volume Tables
 - 4. Volume Table Construction
 - f. Growth studies
5. Log Scaling
- a. Log scaling defined
 - b. Gross and net volumes
 - c. Defects
 - 1. Recognition of Defect Types
 - 2. Cull Allowance for Defects
 - 3. Log Grade Estimation
 - 4. Net Log Volume Determination
 - d. Log scale tables and tools
 - 1. Board Foot Log Rules
 - 2. Cubic Foot Log Rules
 - 3. Diagram Rules
 - 4. Formula Rules
 - e. Identification of species of logs and finished lumber
6. Timber Type Mapping
- a. Aerial photo interpretation
 - b. Species identification
 - c. Delineation methods
7. Other Forest Measurements
- a. Wood products
 - b. By-products
 - c. Water
 - d. Range
 - e. Wildlife
 - f. Recreation
 - g. Soils
 - h. Fisheries

**Forest Measurements
(Content Continued)**

8. Inventory Analysis and Techniques
- a. Data collection
 - b. Data analysis

Laboratory Activities: Individual Laboratory Activities are designed to support course objectives.	
Methods of Evaluation: Lecture Comprehensive Quizzes and Exams Written Critical Thinking Scenarios Problem Analysis and Solution Research and Term Papers	Methods of Evaluation: Laboratory Laboratory Skill Validation by Observation Laboratory Reports Laboratory Research Projects and Reports Laboratory Skill Practicum Exams
Typical Textbooks, Manuals, or Other Support Materials <u>Log Scaling and Timber Cruising Handbook</u> , Dillworth. <u>Forest Mensuration 2003</u> , Husch, Bertram, Thomas Beers, and John A. Keershaw, Jr. John Wiley and Sons. <u>Aerial Photography and Image Interpretation 2003</u> , Paine, David P. and James D. Kaiser. John Wiley and Sons. <u>Introduction to Forestry 2003</u> , Sharpe, Grant, Henlee, John, and Sharpe. McGraw-Hill. <u>Trees and Forest Measurement 2003</u> , West, Phil. Springer Verlag.	
Statewide Articulation: CPSLO-FNR 215, articulated to other universities as specific equivalent by individual community colleges, additional statewide course equivalency articulation currently underway, also currently transfers as lower division elective	
FDRG Lead Signature:	Date:
Mark E. Bender, PhD CSU Stanislaus	
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