Oregon State University
College of Forestry – Dept. of Forest Resources
Forestry 321 (FOR 321) – Forest Mensuration
Fall 2006

Time and Place: Lectures: 8:00 – 8:50, MWF, Peavy 242
Lab: 12:30 – 17:20, T, Peavy 242

Instructor: Jeff Hollenbeck Office: Peavy 035
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Teaching Assts: Nicole Younger Office: Peavy A103
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Prerequisites: MTH241/245, FOR220, ST351/352, FE309 or FOR220, ST314

Texts: Avery, T. E. and H. E. Burkhart. 2002. Forest measurements. 5th ed. McGraw-Hill, New York, NY. 456 pp.

Bell, J. F. and J. R. Dilworth. 2002. Log scaling and timber cruising. OSU Book Store, Inc., Corvallis, OR. 439 pp.

Other reading material will be provided as assigned.

Course Description:

FOR 321 is a 5-unit course introducing forest measurements and some of their applications in forest management. Course topics include techniques for the measurement of standing trees, logs, stand- and forest-level attributes, as well as sampling and data analysis methods.

To manage forest resources effectively, managers require reliable information regarding the quality and quantity of forest resources, and how those resources change over time. Forest mensuration provides these data at both the stand and landscape (forest) level. Although the course focuses on timber resources, we will spend time on other forest

resources, such as wildlife habitat, riparian zones, and fuel loading. Additionally, the measurement and analysis methods covered in this course are broadly applicable to a variety of other natural resource disciplines.

Course Structure:

Forest Mensuration (FOR321) is a lecture-lab course consisting of (3) 50-minute lectures and (1) 5-hour lab per week. This is a considerable time commitment and reflects the 5-credit status of this course. The course is intended to be both theoretical and practical, emphasizing the application of quantitative techniques to answer forest management questions/problems. Topics are presented in both lecture and lab. Labs will mostly consist of fieldwork at sites in the McDonald-Dunn research forest.

Course Objectives:

The overall objective of this course is student understanding of methods and principles of forest measurement at the tree, stand, and landscape (forest) level. Specific objectives include:

- Develop skills necessary for the measurement, analysis, and interpretation of forest mensuration data.
- Understand the quantitative and statistical principles that support measurement and sampling methods.
- Familiarity with instruments and techniques used to aquire forest mensuration data.
- Proficiency in timber cruising, log-scaling, and other skills broadly applied to ecosystem management.
- Professionalism: Professional conduct and ability to produce and present forest mensuration data and products in a professional manner.

Grading:

Grades are based on (7) lab assignments, a final project, an oral presentation, field performance, (2) mid-term exams, and a final exam. All lab assignments have the same value and are graded on a percent basis. The relative composition of grading components are as follows:

Lab reports and field performance	45%
Midterms	20%
Oral presentation	10%
Final exam	25%

Labs:

You will receive materials, maps, and a description of each lab a the beginning of the lab period, or during the lecture period preceding lab. Field procedures will be explained during the start of the lab session. All lab exercises will be conducted by crews of 2 or more students; each crew will work independently.

All lab assignments must be typed and include a title page, table of contents, methods, results, discussion, and conclusion or summary, and a bibliography unless otherwise specified. Tables and sample calculations should be included as necessary (hint: they're usually necessary). Lab assignments must be completed and submitted by the next lab period (5:00pm). Note: submission of your original field notes may be requested; it is advised you obtain 2 field notebooks for lab.

An oral presentation of your final lab will be required near the end of the term. You will present and defend stand examination results during the presentation. Individual crew members will be asked questions about stand diagnosis, analysis and synthesis of results regarding the examined stand. Each crew member is required to participate in the oral presentation.

All, or nearly all, of our labs will be conducted outdoors unless unusually severe weather occurs. Please dress appropriately and bring with you necessary accessories. This typically includes sturdy boots, appropriate clothing (think layers), rain gear, perhaps a cruiser's jacket or vest, and a hard hat (provided). You will also need a field notebook (I suggest write-in-the-rain notebooks), a clipboard, a pencil (not a pen), and a calculator.

Exams:

There will be 2 mid-term exams that relate to current topics in lecture and lab. The final exam will be comprehensive and covers all lecture and lab materials.

Policies:

General:

The following are acceptable reasons for an unplanned class absence, late assignment, etc.

- You are sick or dying
- A close family member is sick or dying
- Natural emergencies (earthquakes, floods, tornados) that directly affect you
- Selected non-natural emergencies (postal employee rampage, etc.) that directly affect you

Planned absences or late assignments may be acceptable if you notify me in advance. Good reasons for a planned absence or late assignment include:

- Attend or present at a professional conference

- Participation in university-sponsored sporting event
- Doctor/dentist appointment

Late assignments:

Lab reports are due in (1) week, by 5:00pm. If you do not turn in your assignment during a lecture or lab period, it must be placed in my mailbox in the Forest Resources Dept. office. You may turn in reports early. Late reports will be accepted for (1) week after the due date for ½ credit. Reports will not be accepted (2) weeks after due date.

Make-up exams:

There will be no make-up exams except for reasons listed above for an unplanned absence or late assignment.

Cell phones:

Please turn off, or switch to vibrate, cell phones during lecture periods, in-class portions of labs, and presentation periods. Violations during oral presentation periods will result in grading penalties. Cell phones are OK for field portions of labs, but please be considerate of your classmates (professional conduct).

Conduct:
Professional, ethical conduct is expected at all times. See College of Forestry Code of Professional Conduct on the web: http://www.cof.orst.edu/cof/teach/honorsys.php

Special assistance:

Please notify the instructor during the first week of classes if you need accommodations for learning or physical disabilities. Also, please notify the instructor if you have any medical conditions that may require special attention.
Note: We will be working outside during labs and frequently encounter stinging insects and poison oak. If you have life-threatening allergies to these, it would be useful to notify your instructor before a potential emergency arises.

Course topics and general schedule:

Note we may need to deviate from this schedule as the term progresses. Topics in bold indicate a guest lecture or lab.

Date	Lecture Topic	Lab Topic
Sept 25	Introduction and stats review	Intro., Equipment,
Sept 27	Statistics and sampling theory	Tree and site quality
Sept 29	Simple random and systematic sampling	measurements
Oct 2	Cluster samples 1 – fixed area plots	**Log Grading and Scaling**
Oct 4	Measuring logs and log rules	
Oct 6	Measuring tree attributes / volume equations	
Oct 9	Regeneration sampling	
Oct 11	Measuring wood quality / log scaling	Regeneration Survey
Oct 13	Measuring vegetation structure, stand density, stocking	
Oct 16	Midterm 1	
Oct 18	Measuring changes: tree and stand growth	Fixed Area Plots
Oct 20	Cluster samples 2 – variable area plot	
Oct 23	Point sampling theory and application	
Oct 25	3-P sampling theory and application	Point Sampling
Oct 27	**Challenges in forest measurements and sampling**	
Oct 30	**Line intersect sampling**	Forest floor / Fuel loading
Nov 1	Line-planar sampling	
Nov 3	**Multi-stage sampling and large scale inventory**	
Nov 6	Midterm 2	
Nov 8	Stratified sampling, photo stratification, double sampling	Capstone Stand Exam
Nov 10	**Quality control and check cruising**	
Nov 13	Stand exam	
Nov 15	**Measurement and inventory of riparian zones**	Capstone Stand Exam
Nov 17	Measuring wildlife habitat resources	
Nov 20	**Monitoring changes at the stand and landscape levels**	Thanksgiving No Lab
Nov 22	Measurements in forest ecosystem management	
Nov 24	Thanksgiving – No lecture	
Nov 27	**Updating and maintaining inventory information**	
Nov 29	Putting the tools together	Oral Presentations
Dec 1	Review and summary	
Dec ?	Final Exam	No Lab

Reading Assignments:

Date	Topic	Avery and Burkhart	Bell and Dilworth
Sept 25	Intro and review	xxx – 9	
Sept 27	Statistics and sampling theory	11 – 33	
Sept 29	Sampling designs	34 – 46	156 – 173
Oct 2	Sampling designs	34 – 46	156 – 173
Oct 4	Regeneration sampling	225 – 227	178 – 180
Oct 6	Tree measurement, volume eqns.	144 – 166	269 – 287
Oct 9	Units of measure / Log rules	100 – 129	287 – 296
Oct 11	Wood quality / Log scaling	130 – 140	49 – 63, 114 – 134
Oct 13	Vegetation structure	211 – 215	
	Stand density and stocking	321 – 330	246 – 248
	Quantifying site quality	312 – 320	273 – 284
Oct 16	Midterm 1		
Oct 18	Measuring changes	337 – 344	
Oct 20	Point sampling theory	230 – 235	354 – 356
Oct 23	Point sampling application	236 – 242	194 – 219
Oct 25	Point sampling application	242 – 256	219 – 247
Oct 27	3-P sampling	259 – 260	
Oct 30	3-P sampling	260 – 269	252 – 264
Nov 1	Forest floor sampling		
Nov 3	Wildlife habitat	394 – 397	
Nov 6	Midterm 2		
Nov 8	Sampling discrete variables…	63 – 66	
Nov 10	Quality control, check cruising		
Nov 13	Stand exam	204 – 206	
Nov 15	Measuring riparian zones		
Nov 17	Measuring wildlife habitat	399 – 407	
Nov 20	Measurement in ecosystem mgmt.		
Nov 22	Monitoring changes		
Nov 24	Thanksgiving break		
Nov 27	Advances in technology		
Nov 29	Putting tools together		
Dec 1	Review and summary		

Required and Suggesting Reading:

Assignments in bold are required. Readings are available in the Forestry Self Learning Center (SLC) Peavy 2xx.

Date	Topic	Reading
Oct 5	Regeneration sampling	**Stein 1992, Stage 1974**
Oct 14	Stand density and stocking	**Stein 1992, Stage 1974**
Nov 2	Forest floor sampling	**Brown 1974**, Maser et al. 1979
Nov 4	Wildlife habitat	**Hayes et al. 1997, Hall et al. 1985, Thomas et al. 1979**

References:

Most of these (in particular the required readings) are available in the SLC.

Brown, J. K. 1974. Handbook for inventorying downed woody material. USDA Forest Service GTR INT-16. 24pp.

Franklin, J. F. and R. T. T. Forman. 1987. Creating landscape pattern by forest cutting: ecological consequences and principles. Landscape Ecology 1:5-18.

Hall, F. C., L. W. Brewer, J. F. Franklin, and R. L. Werner. 1985. Plant communities and stand conditions. pp. 17-31 in E. R. Brown (ed.) Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington. Part I – Capter Narratives. USDA Forest Service PNW Region, Portland, OR.

Hayes, J. P., S. S. Chan, W. H. Emmingham, J. C. Tappeiner, L. D. Kellog, and J. D. Bailey. 1997. Wildlife response to thinning young forests in the Pacific Northwest. Journal of Forestry. 95:28-33.

Li, H., J. F. Franklin, F. J. Swanson, and T. A. Spies. 1993. Developing alternative forest cutting patterns: a simulation approach. Landscape Ecology. 8:63-75.

Maser, C., R. G. Anderson, K. Cormack, J. T. Williams, and R. E. Martin. 1979. Dead and down woody material. pp. 78-95 in J. W. Thomas (ed.) Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington. USDA Forest Service Agriculture Handbook No 553.

Stage, A. R. 1974. Picturing the future forest from regeneration surveys – A research program and scale for defining adequate stocking. 65th Western Forestry Conference, Spokane, WA. Permanent Association Committees proceedings, pp. 74-76.

Stein, W. J. 1992. Regeneration surveys and evaluations. pp. 346-382 in S. D. Hobbs, S. D. Tesch, P. W. Owston, R. E. Stewart, J. C. Tappeiner, and G. E. Wells (eds.)

Reforestation practices in southwestern Oregon and northern California. Forest Research Laboratory, Oregon State University, Corvallis, OR.

Thomas, J. W., H. Black, R. J. Scherzinger, and R. J. Pedersen. 1979. Deer and elk. pp. 104-127 in J. W. Thomas (ed.) Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington. USDA Forest Service Agriculture Handbook No. 553.