



Tree and Stand Dynamics

Course Outline

Module 1.3: Describe and apply models to articulate present and future stand conditions

Standard 1 - Tree and Stand Dynamics

Demonstrable Competency: 3) Describe and apply models to articulate present and future stand conditions

Course Description

Overall objectives of Module 1.3 are to enhance students' knowledge and comprehension of models commonly used to describe stand structure and project stand development and, by extension, forest development over time. Examples of the former include standard yield tables that are frequently used to estimate stand-level attributes of interest for forest management such as volume on an area basis using relatively few easily obtained measures of tree size, and yield curves that similarly relate measures of tree size to merchantable volume. The latter tend to rely upon quantifying competitive interactions among trees such as size-density, density-yield and self-thinning relationships, and using such information to project growth and yield over time. Site index models that make use of age-height relationships to model site productivity, diameter distribution models, gap models, neighbourhood models, resource based stand models, and resource- and individual-based spatially explicit models of stand development (e.g. SORTIE) will also be examined. Participants are encouraged to undertake related field training (Module 1.4)

Specific objectives are to enable students to: Identify, use, and explain predictive tools/models; and explain their strengths and weaknesses.

Course Schedule

This course involves a combination of recorded lectures, readings, assignments and participation in semi-synchronous online discussion forums and synchronous tutorials with instructors and other participants over an **8-week period**:

- **Week 1**
 - **Introductory lectures**
 - “Introduction to Standard 1”
 - **Core lecture**
 - “Approaches to understanding and quantifying tree competition – transition matrix models, Leslie matrices, growth curves, standard yield tables, classical forest yield curves, uses of yield curves, site-index, crown class, canopy stratification, density-yield relationships, reproductive allometry, density management diagrams, growth and yield in thinned stands, size variability as an indicator of competition, measures of size variability, growth-size relationships”
 - **Core readings**
 - Kimmins, J.P. 1997. Forest Ecology: A foundation for sustainable management. 2nd ed. Prentice Hall Upper Saddle River, N.J. 596 p. Chapter 17 models and their roles in ecology and resource management

- **Week 2**
 - **Core lectures**
 - “From stands to forests: modeling, management and conservation – forest modeling definitions, relationships of stand to forest parameters, agent-based and pattern oriented models, yield tables, stand-level growth and yield simulators, transition matrix models, diameter distribution models, gap models, neighborhood models, resource-based stand models, physiological process models, simulation models, SORTIE”
 - **Online discussion forum**

- **Week 3**
 - **Online tutorial with instructor**
 - Discuss content to-date and assignment 1
 - **Introduction to assignment #1**
 - Describe site productivity models, using one or more specific examples, and discuss how these in turn relate to growth and yield models commonly used in forest management planning.

- **Week 4**
 - **Online discussion Forum**
 - **Continue to work on Assignment #1**

- **Week 5**
 - **Assignment #1 due (submit online)**
 - **Online tutorial with instructor**
 - Discuss content to date and assignment #2
 - **Introduction to assignment #2**

- Discuss the strengths and weaknesses of spatially explicit versus non-spatial forest estate models, using the Patchworks model (www.spatial.ca) and Ontario's Sustainable Forest Management Model (SFMM) as examples to compare and contrast. If you had to choose between either Model, which one would you choose to deploy and why?
- **Week 6**
 - **Submit proposal for final paper**
- **Week 7-8**
 - **Continue to work on Assignment #2**
 - **Assignment #2 due end of week 8 (submit online)**

Grading

- Discussion forum posts: 20%
- Participation in tutorials: 10%
- Assignment 1 - short essay: 20%
- Final paper proposal: 5%
- Assignment 2 - final paper: 45%



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