



Tree and Stand Dynamics

Course Outline

Module 1.2: Describe current and past tree and stand conditions and the processes that led to them and articulate possible future conditions

Standard 1 - Tree and Stand Dynamics

Demonstrable Competency: 2) Describe current and past tree and stand conditions and the processes that led to them and articulate possible future conditions

Note: This Module partially addresses Standard 1, Demonstrable Competency 2. In order to fully demonstrate the components of the competency listed above, participants must (a) successfully complete the related field training course (Module 1.4) or (b) arrange in advance with the provincial regulator an alternate “hands on” evaluation method in the field

Course Description

Overall objectives of Module 1.2 are to enhance student's knowledge and comprehension of forest stand dynamics, which requires an understanding of tree-level functional biology and attributes that influence stand structure and development. Participants will learn how tree species composition and tree size and age distributions provide evidence as to stand origin and disturbance history, as well as means to predict future stand conditions. Key topics include: the influences of water, light, and other biotic and abiotic factors on tree form and function; dendrology and its applications; conceptual models of stand dynamics and succession; and gap dynamics. Selection silviculture is introduced to demonstrate the integration of related knowledge requirements in practice. Participants are strongly encouraged to undertake related field training (Module 1.4).

Specific objectives are to prepare students to be able to: Measure tree-level attributes; Determine tree quality; Explain the resource potential of trees; Explain processes that influence tree health and vigour; Measure stand-level attributes; Determine stand origin; Recognize the range of values found in a stand; Define succession and stand dynamics; Describe and analyze the agents driving stand dynamics; and For a range of different stands, be able to describe the dynamics

that have led to the current stand structure and be able to predict future stand structures.

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**
 - “Tree functional biology - Water and other abiotic factors - conifer vs. hardwood water transport, flood tolerance, wind, temperature, shade, drought tolerance, and other factors that influence the form and functional biology of trees, stands, and forests.
 - “Dendrochronology – tree ring measurements and related applications including tree growth dynamics, disturbance history, tree demography, cross dating, growth patterns, calculating basal area increments, climate-BAI correlations”
 - **Core readings**
 - Chapter 2 - Forest stand structure, composition and function and Chapter 3 - Disturbance, recovery and stability 1997. Creating a Forestry for the 21st Century: The Science of Ecosystem Management. Edited by K.A. Kohm and J.F. Franklin. Island Press, Washington, D.C., 475 p.

- **Week 2**
 - **Core lectures**
 - “Stand dynamics – “classical” 4-stage model of stand development, drivers of change in stand structure, old growth concepts and associated definitions, old growth characteristics, gap-phase dynamics “
 - “Selection silviculture – target stand basal area, theoretical growth patterns, negative exponential distribution and Q-factors, theoretical arguments for exponential distribution, Relascopes (prisms) and point sampling, overview of stand analysis tally sheets for point sampling BA by species, size category, and quality [AGS &UGS])”
 - **Core readings**
 - Franklin et al. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example. For Ecol Manage 155: 395-423.
 - **Online discussion forum**

- **Week 3**
 - **Online tutorial with instructor**
 - Discuss content to-date and assignment 1
 - **Introduction to assignment #1**
 - Define and discuss one biotic and one abiotic process that may affect tree health and vigour, making use of relatively mature trees commonly found in mature forest stands of either the Boreal or Great Lakes – St. Lawrence Forest Regions of Ontario as examples. Include both the common and latin names of the trees you choose as examples, and comment on how the life history characteristics of those trees render them either more or less susceptible to the processes that affect health and vigour that you have chosen to discuss.

- **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**
 - Describe in detail a common successional pathway following a severe fire in a mature and fully stocked Jack pine dominated stand in northwestern Ontario. Describe expected stand/site conditions 5, 20, 60, 80, and 120 years following the stand initiating fire disturbance, including successional transitions in species composition and stand structure. Assume that the stand is not significantly or severely disturbed by harvesting, fire, insects, disease and weather events throughout the 120 year time period.

- **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%



Bridge Training Program for Foresters

Funded by:

