

# SILVICS: Ecology and Physiology of Trees of B.C.

## FSTY 208-3 Winter 2005

<b>Instructor:</b>	Scott Green (8-335, Office hours: T,Th 3:00-4:00 pm)
<b>Lectures:</b>	2 x 1.4 hour lectures / week (5-124: T,Th 1:00-2:20 pm)
<b>Evaluation:</b>	
	Midterm Exam 30%
	Group Presentation 20%
	Quizzes – Required Readings 15%
	FINAL EXAM <u>35%</u>
	100%

### Course Philosophy:

'Silvics' can be very broadly defined as the ecology of trees. In more specific terms, it deals with: "the biologic(al) characteristics of individual trees (autecology) and communities of them (synecology). ...how trees grow and reproduce, as well as the ways that the physical environment influences their physiology. ...interactions between the physical environment and the forest community and between members of the forest community, over time." (Nyland 1996).<sup>1</sup>

FSTY 208 will focus primarily on regional species, with considerations about silvical issues unique to the interior and north of British Columbia. Students will be expected to develop a strong familiarity with the following subject areas: (1) importance and interaction of biology, climate, edaphics, time, site-history, and disturbance on the growth, physiology, and regeneration of species in B.C., (2) key ecological and life-history information for B.C. tree species at various stages of development, and (3) the broader role that tree species play in sustaining forest ecosystems.

Ecological traits relevant to reproduction, establishment, growth, health and (if applicable) wood quality will be compared for a collection of regionally and continentally commercially important tree species. These traits will also be considered for regionally important non-timber species that are important for other values and/or are strong competitors of commercial species. Rather than consider each species in isolation from other members in the forest community, we will establish a conceptual foundation for making inter-species comparisons. Our conceptual foundation will be based on species life-history and adaptive characteristics (i.e. the collection of traits that make a genus, species, or genotype a good 'competitor' within a particular subset of forest habitats encountered). Students will not only become familiar with a collection of attributes for a number of species, but they will also be able to compare these attributes for a collection of commercially and non-commercially important species as it relates to their productivity, competitive interactions, and climatic tolerances in managed and non-managed systems.

### Course Delivery:

A tentative lecture schedule is given at the end of this handout. Scheduling will vary depending on actual progression through the material. The focus of the course will be on integrating ecological and physiological information into a comprehensive understanding of tree silvics – that is, *why is a given tree found here?* And, *why is that tree here now?* Exams will largely be composed of multiple-choice, true/false and short-answer questions. In addition, there will be one major class project, which is described in separate handout.

### **Prerequisites:**

- ⇒ FSTY 201 (Plant Systems), FSTY 205 (Forest Soils)
- ⇒ Corequisite: FSTY 206 (Forest Biology).

### **Required Readings:**

Required readings provide material that supplements lecture materials, and they should help you develop a broader understanding of species ecology and interactions. All required readings will be available as PDF files in the FSTY 208 folder on the G drive. Readings will be due on the date indicated in the lecture schedule. *As the reading assignments are fairly light, you will be expected to have a good grasp of the material.* Readings *may be* discussed in class, and your understanding of material from the readings and discussions will be assessed in three quizzes worth 15% of your grade.

### **Supplemental Reading Material:**

#### *Silvics/Dendrology*

- 1) Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Ltd., Ontario. pp. 502.
- 2) Klinka, K., Skoda, L., Worrall, J., Varga, P. and V.J. Krajina 1996. The Distribution and Synopsis of Ecological and Silvical Characteristics of Tree Species of British Columbia's Forests. ON RESERVE
- 3) Burns, R.M. and Honkala, B.H. (eds) 1990. Silvics of North America, Vol.1: Conifers. Agricultural Handbook # 654. United States Department of Agriculture, Forest Service, Washington, D.C., U.S.A. pp. 675. (Available online at: [http://www.na.fs.fed.us/spfo/pubs/silvics\\_manual/table\\_of\\_contents.htm](http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm))
- 4) Burns, R.M. and Honkala, B.H. (eds) 1990. Silvics of North America, Vol.2: Hardwoods. Agricultural Handbook # 654. United States Department of Agriculture, Forest Service, Washington, D.C., U.S.A. pp. 877. (Available online at: [http://www.na.fs.fed.us/spfo/pubs/silvics\\_manual/table\\_of\\_contents.htm](http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm))

#### *Plant Physiology*

- 1) Taiz & Zeiger 1991. Plant Physiology. Benjamin/Cummings Publ. Co., Inc.

#### *Conifer Physiology & Forest Ecology*

- 1) Kimmins, J.P. 1997. Forest Ecology. Prentice-Hall
- 2) Barnes et al. 1998. Forest Ecology. Wiley Press
- 3) Smith & Hinckley (ed) 1995. Resource Physiology of Conifers. Academic Press
- 4) Smith & Hinckley (ed) 1995. Ecophysiology of Coniferous Forests. Academic Press
- 5) Perry, D.A. 1994. Forest Ecosystems. Johns Hopkins Univ. Press Inc., Baltimore

#### *Mixedwood Silviculture & Physiology*

- 1) Comeau & Thomas 1996. Silviculture of Temperate and Boreal Broadleaf-Conifer Mixtures. Ministry of Forests Research Program. B.C.

### **Group Presentation: Forest Responses to Climate Change in B.C.**

*See separate handout for guidelines*

## Major Tree Species in British Columbia: (\*Target species)

### Evergreen Conifers

- 1) Genus **Abies**:
  - A. amabilis* (amabilis fir/Pacific silver fir)\*
  - A. grandis* (grand fir)
  - A. lasiocarpa* (subalpine fir)\*
  
- 2) Genus **Picea**:
  - P. engelmannii* (Engelmann spruce)\*
  - P. sitchensis* (sitka spruce)\*
  - P. glauca* (white spruce)
  - P. mariana* (black spruce)\*
  
- 3) Genus **Pinus**:
  - P. contorta* (lodgepole pine)\*
  - P. albicaulis* (whitebark pine)\*
  - P. flexilis* (limber pine)
  - P. monticola* (western white pine)\*
  - P. ponderosa* (ponderosa pine)\*
  
- 4) Genus **Tsuga**:
  - T. heterophylla* (western hemlock)\*
  - T. mertensiana* (mountain hemlock)\*
  
- 5) Genus **Thuja**:
  - T. plicata* (western redcedar)\*
  
- 6) Genus **Misc**:
  - Pseudotsuga menziesii* (Douglas fir)\*
  - Chamaecyparis nootkatensis* (Alaska/yellow cedar)
  - Juniperus scopularum* (Rocky Mountain juniper)

### Deciduous Conifers

- 1) Genus **Larix**:
  - L. laricina* (tamarack)
  - L. lyallii* (alpine larch)\*
  - L. occidentalis* (western larch)\*

### Deciduous Broad-Leaves

- 1) Genus **Betula**:
  - Betula papyrifera* (paper birch)\*
  
- 2) Genus **Populus**:
  - Populus balsamifera* (balsam poplar)
  - Populus tremuloides* (trembling aspen)\*
  - Populus trichocarpa* (black poplar)

## Tentative Class Schedule

Date	Topic	Notes	Required Reading
January 4	Introduction to Silvics		
January 6	Physiological Ecology	Group Project Orientation	
January 11	Physiological Ecology		Fowells and Means
January 13	Physiological Ecology		
January 18	<b>No Class</b>	Group Project Meetings	
January 20	Regeneration Ecology		
January 25	Ecosystems and the Environment		Green
January 27	Adaptation Ecology		
February 1	Adaptation Ecology		
February 3	Adaptation Ecology		
February 8	Adaptation Ecology	<b>Quiz #1</b>	Loehle
February 10	Disturbance/Succession Ecology		
February 14-18	***** No Class *****	***** Winter Break *****	
February 22	Disturbance/Succession Ecology		Varga and Klinka
February 24	<b>MIDTERM EXAM</b>		
March 1	<b>Shade Intolerance Module:</b>		Zeglan
March 3	Genus <i>Pinus</i> , <i>Larix</i> , <i>Populus</i> , <i>Betula</i>		
March 8			Han et al.
March 10		<b>Quiz #2</b>	Landhausser et al.
March 15	<b>Intermediate Shade Tolerance Module:</b>	Group Project Outlines Due	Woodruff et al.
March 17	Genus <i>Picea</i> , <i>Pseudotsuga</i>		
March 22			
March 24	<b>Shade Tolerance Module:</b>		Gedalof and Smith
March 29	Genus <i>Abies</i> , <i>Tsuga</i> , <i>Thuja</i>		
March 31		<b>Quiz #3</b>	
April 5	Presentations (Groups 1-5)		
April 7	Presentations (Groups 6-10)		
<b>TBA</b>	<b>FINAL EXAM</b>	Extended Office Hours	

Note: all required readings can be found in the FSTY 208 folder on the G drive.