Department of Science & Technology

Bachelor of Applied Forest Resource Management

Forest Ecology **(FO 2020) 3(3-0-3)**

Calender Description
The course examines the structure and function of forest ecosystems. Different levels of organization. Energy flow and productivity. Nutrient cycling within and between systems. Genetic aspects of ecosystems. Introduction to abiotic environment and implications to forest practices. Autecology of important tree species. Plant population ecology. Community ecology and biodiversity. Concept of succession and special role of fire. Ecosystem classification. Current issues in forest ecology.

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Prerequisites: BI 2080, BT2400, FO1220(c)

Transfer Status: Athabasca University BIOL 2xx; Augustana University College BIO 2xx

Lectures:	Tuesdays and Thursdays 1:00 – 2:20	B304
Lab:	Mondays 2:30 – 5:20	B305

Required Textbook
Kimmins JP. 1996. **Forest Ecology**. Prentice Hall, Upper Saddle River, New Jersey.

Other References
Barnes BV et al. 1998. **Forest Ecology.** 4th Edition. John Wiley and Sons. (reserved)
Terry D. 1994. **Forest Ecosystems**. University of John Hopkins Press. (reserved)
Waring RH and Schlesinger WH. 1985. **Forest Ecosystems: Concepts and Management**. Academic Press, Florida.
Burns, R.M. and Honkala, B.H. 1990. Silvics of North America (Vol. I and II) Agriculture Handbook 654, USDA Forest Serv., Washington, D.C. (reserved)

Scientific Journals and Periodicals (available in the Library)
Canadian Journal of Forest Research
Forestry Chronicle
Northern Journal of Applied Forestry
Canadian Journal of Botany

Useful Web Sites
www.metla.fi; www.canadian-forests.com; www.fs.fed.us; www.forestnet.com; www.foresters.org; www.forestindustry.com www.geocities.com;

Course Content

Forest Ecology (FO 2020) examines the structure and function of forest ecosystems. Since the course has strong links with Forest Ecosystem Management (FO 3670) and leads directly into Silviculture (FO 3130, the practical applications and implications of forest ecology in ecosystem management are emphasized. The following lists the major topics to be addressed in this course and the required or suggested readings in two primary references:

Topic	Week	Readings (Chapters)	
		Kimmins, 1996 (required)	Barnes et al. 1998 (suggested)
Definition and development of forest ecology	Week 1	1 & 2	1
The role of forest ecology in forestry, principle of determinism,	Week 2	1 & 2	1
Forest ecosystem classification: Importance to forestry, different classification schemes in the world, ecosystem classification in Alberta (natural regions & ecosites), introduction to BC biogeoclimatic classification, applications in forest management.	Week 13 & part of week 14	16	2 & part of 13
The concept of forest ecosystem – complexity, interaction & interdependency, and temporal changes	Week 3	3	2 & 3
Production Ecology (energy flow) and Forest Productivity: concept of food webs, GPP, NPP, crop, and yield, determinants of forest productivity (entry, transfer, storage, allocation), energy flow in detritus food web and relevance to decomposition, impacts of forest harvesting on energy flow	Week 4 & 5	4	13 & 18
Nutrient cycling in ecosystems: between ecosystems, within ecosystems, within individual tree, nitrogen, the key element in many northern forests, nutrient cycling and harvesting	Week 6	5	19
Genetic aspects of forest ecosystems and implications for forest management	Part of week 7	6	4
Abiotic (physical) environment in ecosystems and their importance to forestry: Light, temperature, wind, soil & water	Part of Week 7 and week 8	7, 8, 9 & 10	7, 8, 9, 10 & 11
The special role of fire in forest ecosystems: Conditions and types, concepts of fire cycle, interval, & frequency, fire history & regimes in Alberta and north America, effects on soil, plants, & animals, effects of fire exclusion.	Week 9	12	12

Autecology (or silvics) of major trees in Canada (part of the lab)		(References will be provided)	
Plant population & community ecology, biodiversity and forest practices: Community structure and composition, species distribution along natural conditions (association vs continuum), ecotones & tree lines, biodiversity concept & assessment	Week 10 & part of week 11	13 & 14	5, 15 and 20
Temporal changes of forest ecosystems – forest succession: Primary & secondary succession, driving forces, concepts of sere & seral stages, climax theory, recent theories and models of succession, importance of species, facilitation, tolerance and inhibition pathways, mechanisms of successional changes, impacts by & implications to forest practices	Part of week 11 and week 12	15	17 and part of 16
Recent issues in forest ecology: Forest stability & impacts by harvesting, forest health, forest sustainability, forest conservation (e.g. old growth)	part of week 14 & week 15	18 and 19	Part of 21

Requirements

Presence at each laboratory for this course is compulsory. A passing grade in the lab is required to pass the course. Marks will be deducted from overdue lab reports and assignments at a rate of 10% per day.

Evaluation

Assignments	15%
Lab Reports	20%
Midterm Exam	25%
Final Exam	40%
	100%

Laboratory Schedule

Week	Date	Lab #	Description
1	2 Sept		No lab
2	9 Sept	1a	Concept of forest ecosystem
3	16 Sept	1b	Ecological analysis of different forest types
4	23 Sept	1c	1) pine dry site, black spruce muskeg 2) mixed-wood and pure aspen stands
5	30 Sept	2a	Forest succession after harvest
6	7 Oct	2b	
7	14 Oct		Thanksgiving – no lab
8	21 Oct		TBA
9	28 Oct	3	Nutrient cycling in forest ecosystems Slide demonstration and in-lab worksheet
10	4 Nov	4	Autoecology of major tree species in Canada
11	11 Nov		Remembrance day – no lab
12	18 Nov	5	TBA
13	25 Nov	6	TBA
14	2 Dec	7	Ecological computer simulation (FORTOON)

The detailed lab instruction will be distributed before each lab. Each student is expected to supply the following at each lab: plant identification manual or book (e.g. Plants of the Western Boreal Forest & Parkland), **calculator**, pencils, eraser, some paper, and binder to hold data sheets. Please dress accordingly for possible bad weather during the field labs.