Grande Prairie Regional College
Department of Science
Bachelor of Applied Forest Resource Management
Course Outline (Winter 2005)

Course: Forest Soils and Hydrology (FO2130) 3(3-0-3)

Instructor	**Office**	**Phone**	**E-mail**
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Classroom	**Lab**	**Time of Lectures**	**Time of Lab**
C316	J126	Monday & Wednesday (8:30 – 9:50)	Monday (14:30 - 17:20)

Prerequisite: FO1220

Calendar Description

Explore the chemical and biological processes occurring in forest floors and forest soils. Advance the understanding of nutrient cycles in forest ecological systems. Tree nutrition and its relationship with fertilization. Examine in detail the water cycles in forest systems. Introduce systematically the concept and system of land capability classification and site description. Emphasize soil management for silviculture, nursery and problem soils. Investigate the impacts of forest fire and harvest on soil and water quality.

Course Objectives

At the completion of the course, the student should be able to understand:

1. the fundamental properties and processes of forest soils and their relationships to tree growth/site productivity;
2. the impacts of forest operations and silvicultural practices on forest soil properties and processes and the relationships to enhancement of site productivity and sustainability;
3. the basic hydrological processes in forest soils as related to forest management practices; and
4. the basic field and laboratory analysis of forest soils and hydrology.

Required Textbook

Fisher, Richard F., and Dan Binkley. 2000. Ecology and Management of Forest Soils. 3rd Edition. John Wiley & Sons, New York, N.Y.

Major Reference Books

Hewlett, J.D. 1982. Principles of Forest Hydrology. The University of Georgia Press, Athens, Ga.

Beckingham, J.D. and J.H. Archibald. 1996. Field Guide to Ecosites of Northern Alberta. Canadian Forest Service, Northwest Region.

Brooks, K.N., Ffolliott, P.F., Gregersen, H.M., and DeBano, L.F. 1997. Hydrology and the Management of Watersheds. Iowa State University Press, Ames, Iowa.

Brady, N.C. and R.R. Weil. 2002. The Nature and Properties of Soils. Thirteenth (or earlier) Edition. Prentice Hall, New Jersey. 960 p.

Useful Web Sites

Canadian Soil Information System (http://res.agr.ca/CANSIS/); Forest Soils Division (S-7), SSSA (www.forestsoils.org/S-7/); Soil Science Society of America (www.soils.org); Canadian Society of Soil Science (www.csss.ca, with links to Soils of Canada web site); US Dept. of Agriculture (www.usda.gov); Natural Resources Conservation Service (NRCS) (www.nrcs.usda.gov).

Course Content

Topic	Week	Readings (Chapters)	
		Textbook (required)	Brady & Weil (suggested)
Course introduction, uniqueness of forest soils, physical properties of forest soils.	Week 1	1 & 4	4
Physical properties (including engineering properties) of forest soils as related to forest environments and practices.	Week 2	4	4
Chemical properties of forest soils	Week 3	Part of 5	8 & 9
Forest floors and soil organic matter	Week 4	7	12
Nutrient cycling in forest soils and nutrient availability	Week 5	9	13, 14 & 15
Roots in forest soils and nutrient uptake	Week 6	8 & part of 5	
(Winter break)	Week 7		
Nutrition management: limitations & fertilization	Week 8	12 & 13	16
Nutrition management: limitations & fertilization	Week 9	12 & 13	16
Effects of forest management practices and fires and forest soil management	Week 10	Parts of 15 & 10	
Long-term soil productivity	Week 11	16	
Forest soil classification	Week 12	11	
Introduction to forest hydrology – basic concepts, general water cycle, water balance of regions and drainage basins, precipitation, snowpack and melt, subsurface water infiltration and percolation.	Week 13 & 14	Hewlett 1982 (Selections in Chapters 1, 2, 4 and 5)	Brooks et al. 1997 (Chapter 2 & 4)
Introduction to forest hydrology – Evaporation and evapotranspiration, surface water, the hydrograph and runoff process, erosion and sedimentation in relation to forests. Course review	Week 15	Hewlett (selections in Chapters 6, 7, and 8)	Brooks et al. 1997 (Chapter 3 & 7)

Requirements

Regular attendance to the lectures and participation in classroom discussion are required. Presence at each laboratory for this course is compulsory. A passing grade in the lab is required to pass the course. A medical note from your Doctor(s) is required for all excused absences. Mark will be deducted on the overdue assignment(s) and lab report(s) at a rate of 20% per day. Plagiarism is a serious academic offence and will be dealt with according to the relevant College policies/regulations. The instructor reserves the right to use electronic plagiarism detection services.

Evaluation (relative percentage)

Quizzes/Assignments	20%
Lab Reports	20%
Midterm Exam	25%
Final Exam	35%
	100%

Alpha Grade	***4-Point Equivalent***	***Designation***
A+	4.0	*Excellent*
A	4.0	
A-	3.7	*First Class Standing*
B+	3.3	
B	3.0	*Good*
B-	2.7	
C+	2.3	*Satisfactory*
C	2.0	
C-	1.7	
D+	1.3	*Minimal Pass*
D	1.0	
F	0.0	*Fail*

Laboratory Schedule

WK	LAB #	DESCRIPTION
1	1	Introduction
2	2	Soil compaction and penetrability
3	3	Impacts of soil compaction on seed germination and plant growth - starting
4	4 & 3	1) Continuing Lab 3 2) Soil fertility evaluation – available N
5	5 & 3	1) Continuing Lab 3 2) Soil fertility evaluation – Fertilizer calculation
6	6 & 3	1) Continuing Lab 3 2) Analysis of forest soils at GPRC Training Forest & implications to forest practice (I)
7		Winter break and continuing Lab 3
8	3	Impacts of soil compaction on seed germination and plant growth – harvesting and growth analysis
9	7	Snowpack measurements and snow bulk density
10	8	Enhancement of Forest Soil Productivity (I)
11	6 & 8	1) Analysis of forest soils at GPRC Training Forest & implications to forest practice (II) 2) Enhancement of Forest Soil Productivity (II)
12	9	Presentation of Lab 8
13	10	Saturated water flow in soils and hydraulic conductivity
14	11	Measuring stream discharge and estimating size of culvert required
15	12	Open session

The detailed lab instruction will be distributed before each lab. Each student is expected to supply the following at each lab: **calculator**, pencils, eraser, some paper, and binder to hold data sheets.