

GRANDE PRAIRIE REGIONAL COLLEGE
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Bachelor of Applied Forest Resource Management

FOREST FIRE MANAGEMENT: FO3270

Pre-requisite: Forest Ecology (FO2020)

Calender Description:

The natural role of fire. Physics and chemistry of combustion. Fire behaviour, prediction, detection, suppression, prevention, control. Fuel types and fuel cycles. Fire danger rating. The elements of a fire control program. Prescribed burning - pros and cons.

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Lectures: Monday, Wednesday C316: 10:00 - 11:20

Lab: Tuesday B305: 14:30 - 17:20

Course Description:

The course reviews the attitudes to and the history of fire in Alberta. From being regarded as an unavoidable evil to the present ecosystem management strategy of trying to replicate the effects of fire.

The phases of combustion:

- preignition
- ignition
- combustion
- extinction

are examined in relation to the chemistry and physics of fuels.

Fire behaviour is considered as a function of:

- fuel state and abundance
- season
- wind
- topography

The ecological role of fire is looked at from a historical perspective. We will compare Tansley's pyral climax theory with Clement's monocl意思max theory.

The special role of fire in the historical development of the lodgepole pine, jack pine and mixedwood forests of Alberta is compared with modern practices and beliefs. Fire dependent ecosystems are examined in terms of morphological and reproductive adaptations.

The history of fire as a cultural tool in Canada is traced from the European settlers to the present and fitted into the global scene.

We will review fire management programs in general and the Alberta Model in particular.

Discussion of the elements of a control program:

- prevention
- detection
- communication.

Fire suppression is looked at, with particular emphasis on safety in fire fighting. Finally, we will discuss the use of fire as a silvicultural tool. Its strengths, also its weaknesses that threatened to eliminate its use in some jurisdictions.

TEXTS AND REFERENCES

REQUIRED

- Hirsch, K.G. (1996). Canadian Forest Fire Behaviour Prediction (FBP) System: user's guide. Can. For. Serv., North. For. Cent., Edmonton. Special Report 7. 122 pp.
- Taylor, S.W., Pike, R.G. and M.E. Alexander. 1997. Field guide to the Canadian forest fire behaviour (FBP) prediction system. Can. For. Serv., North. For. Cent., Edmonton. Special Report 11. 60 pp.

RECOMMENDED

- Pyne, S.J. 1996. Introduction to wildland fire. John Wiley & Sons, Inc. Toronto. 769 pp.

TEXTS AVAILABLE IN THE LIBRARY

- Alexander, M.E. and G.F. Bisgrove. 1990. The art and science of fire management. Can. For. Serv., North. For. Cent., Edmonton. Inf. Rep. NOR-X-309. 333 pp.
- Chandler, C., Cheney, P., Thomas, P., Trabaud, L. and D. Williams. 1983. Fire in Forestry, Forest fire management and organization. 2 Vols. John Wiley & Sons, Inc. Toronto. 450 pp., 98 pp.
- Compendium of Canadian Forestry Statistics. (1996). Canadian Council of Forest Ministers.
- Edmonds, R.L., Agee, J.K. and R.I. Gara. (2000). Forest Health and Protection. McGraw-Hill, Toronto. 630 pp.
- Kimmins, J.P. 1997. Forest Ecology. Prentice Hall, New Jersey. Pages 296-314.
- Murphy, P.J. 1985. History of forest and prairie fire control policy in Alberta. Alta En. And Nat. Res. Edmonton. ENR Report number; T/77. 408 pp.
- Pyne, S.J. 1996. Introduction to wildland fire. John Wiley & Sons, Inc. Toronto. 769 pp.
- Wright, Henry A. and Arthur W. Bailey. (1982). FIRE ECOLOGY United States and Southern Canada. John Wiley & Sons. Toronto. 501 pp.

SCIENTIFIC JOURNALS AND PERIODICALS AVAILABLE IN THE LIBRARY

Canadian Journal of Forest Research
Forestry Chronicle
Northern Journal of Applied Forestry
Silviculture

EXAMINATIONS

Midterm	35%
Assignments, reports, quizzes	25%
Fuel-type field exam	5%
Final exam	35%

LECTURE SCHEDULE

The nature of fire	week 1
➤ phases of combustion	
➤ physics and chemistry of fuels	
Fire behaviour	weeks 2, 3
➤ how fires grow and spread	
➤ distribution of fires	
➤ the FBP (Fire Behaviour Prediction) System	
Wildland fuels	week 4
➤ characteristics and histories	
Fire weather	week 5
➤ importance of weather information in a fire	
➤ role of weather in danger rating systems	
Fire and ecosystem management	weeks 6, 7
Fire ecology	
➤ species adapted to fire	
➤ Tansley's pyral climax theory	
➤ the effects of fire (or its absence) on succession	
Cultural aspects of fire	
➤ traditional	
➤ current	
Fire management	weeks 8, 9
➤ historical, economic and political considerations	
➤ development of fire policy	
➤ fire management structure in Alberta	
The elements of a fire management program	weeks 10, 11
➤ early detection and communication systems	
➤ prevention, detection, communication	
➤ management of the fuel load	
Fire suppression	weeks 12–14
➤ evolution of control methods	
➤ the resources, manpower and equipment	
➤ organization of suppression activities	
➤ safety in fire fighting	
Determining the origin of a fire	
Prescribed fire	week 15
➤ as a management tool in forestry and other resources	
➤ techniques and tactics	

Fire Management Lab Schedule (Winter, 2005)

Date	Lab	Location	Topic
Jan 11	1	Indoor	Fire history in Alberta, analysis of fire records <ul style="list-style-type: none"> ➤ Statistical comparison of three periods; pre - 1960, 1961 – 1983, 1984 - present
Jan 18	2	Indoor	Classifying fuel types <ul style="list-style-type: none"> ➤ Assigning different stands to the most appropriate fuel type in FBP system
Jan 25	3	Indoor	Using the tables for the “Canadian Forest Fire Weather Index System.”
Feb 1	4	Indoor	FBP System Field Guide Using the field guide to derive outputs from different input scenarios.
Feb 8	5	Indoor	Using the FBP and FOFEM computer modelling systems Fire Weather Index (FWI) <ul style="list-style-type: none"> ➤ Working with the FWI portion of the Fire Behaviour Prediction (FBP) system. ➤ Three scenarios involving FFMC, DMC and DC. Vary precipitation while holding FFMC, DMC and DC Constant First Order Fire Effects Model (FOFEM) <ul style="list-style-type: none"> ➤ Effects of varying flame length on pine versus spruce
Feb 15	6	Indoor	Using the FBP computer model The FBP module - wind direction and slope <ul style="list-style-type: none"> ➤ Wind direction and slope ➤ Acceleration in slash fuel types ➤ Effect of fuel loading on acceleration Combined effects of temperature and RH on ROS
Feb 22	7		Reading week
Mar 1	8	Indoor	Effect of fire on opening of serotinous cones and its effects on seeds released from the cones <ul style="list-style-type: none"> ➤ Use the muffle furnace to simulate the effects of fire. <ul style="list-style-type: none"> • Oven settings of 300°C, 350°C 800°C. • Jack pine cones exposed to each temperature for 15 secs, 30 secs, 45 secs and 60 secs. • Record numbers of seeds released at each temperature.
Mar 8	9	Indoor	Fire behaviour – interactive session with Jeff Henrick (Fire Behaviour Specialist from Alberta L.F.S.).

Date	Lab	Location	Topic (continued)
Mar 15	10	Indoor	Seeds released by heat (continuing lab 8) <ul style="list-style-type: none"> ➤ Collecting germination results ➤ Graphing results (2002 plus previous years) ➤ Preparing report
Mar 22	11	Indoor	Use of foam in fire fighting – an ASRD video.
Mar 29	12	Field	Lab exam – assigning fuel types, observation of fire precaution by homes in the urban/wildland interface.
Apr 5	13	Field	Visit to Alberta LFS warehouse and office <ul style="list-style-type: none"> ➤ All aspects of pumps, hoses and foam, including use, maintenance and “tricks of the trade.” ➤ activities on and around the “duty desk”

Note: If necessary, labs may be “re-jigged” to better fit with ongoing lecture topics.