

# GRANDE PRAIRIE REGIONAL COLLEGE

## DEPARTMENT OF SCIENCE AND TECHNOLOGY

### Bachelor of Applied Forest Resource Management

#### FOREST FIRE MANAGEMENT: FO3270

**Pre-requisite:** Forest Ecology (FO2020)

**Calendar 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.

**Instructor:** Albert Sproule  
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Lectures: Monday, Wednesday C316: 10:00 - 11:20  
Lab: Thursday 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 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 have virtually eliminated its use in some jurisdictions.

## **TEXTS AND REFERENCES**

### **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.

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.

### **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	30%
Final exam	35%

## LECTURE SCHEDULE

<b>The nature of fire</b>	week 1
> phases of combustion	
> physics and chemistry of fuels	
<b>Fire behaviour</b>	weeks 2, 3
> how fires grow and spread	
> distribution of fires	
> the FBP (Fire Behaviour Prediction) System	
<b>Wildland fuels</b>	week 4
> characteristics and histories	
<b>Fire weather</b>	week 5
> importance of weather information in a fire	
> role of weather in danger rating systems	
<b>Fire ecology</b>	weeks 6, 7
> role of fire in the ecosystem	
> species adapted to fire	
> Tansley's pyral climax theory	
> the effects of fire (or its absence) on succession	
<b>Cultural aspects of fire</b>	week 8
> traditional	
> current	
<b>Fire management</b>	week 9, 10
> historical, economic and political considerations	
> development of fire policy	
> fire management structure in Alberta	
<b>The elements of a fire management program</b>	weeks 11, 12
> early detection and communication systems	
> prevention, detection, communication	
> management of the fuel load	
<b>Fire suppression</b>	weeks 13 - 14
> evolution of control methods	
> the resources, manpower and equipment	
> organization of suppression activities	
> safety in fire fighting	
<b>Prescribed fire</b>	week 15
> as a management tool in forestry and other resources	
> techniques and tactics	

## LAB SCHEDULE

- Week I** Fire history in Alberta, analysis of fire records
- Statistical comparison of three periods
  - pre - 1960, 1961 - 1983, 1984 - present
- Week II** Classifying fuel types
- Assigning different stands to the most appropriate fuel type in FBP system
- Week III** FBP System Field Guide
- Using the field guide to derive outputs from different input scenarios.
- Week IV** Using the FBP computer model  
Fire Weather Index (FWI)
- 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.
- Week V** Using the FBP computer model  
The FBP module - wind direction and slope
- Using the FBP module to investigate the interaction of slope and wind direction and their combined effect on Rate of Spread (ROS).
- Effect of temperature and relative humidity on ROS
- Observe the combined effects of temperature and relative humidity by tracking a 24 hour sequence of hourly temperature and relative humidity readings from the Virginia Hills fire (1998).
- Week VI** Fire behaviour – interactive session with Jeff Henricks (Fire Behaviour Specialist from Alberta L.F.S.).
- Week VII** Effect of fire on opening of serotinous cones and its effects on seeds released from the cones
- Use the muffle furnace to simulate the effects of fire.  
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.
- Week VIII** Reading week
- Week IX** Preparation of seeds from lab V for germination tests.
- Dewing, separating empty from filled, scarification.
- Note:** The actual germination tests will be conducted by students at home. Results will be discussed during a regular lecture session.
- Week X** Germination of seeds from lab IX and completion of tables I, II and III.

Weeks XI,  
XII, XIII

**Pumps, hoses and the use of foam, with Dave Brown (Fire Specialist formerly with Alberta L.F.S.).**

- All aspects of pumps, hoses and foam, including use, maintenance and "tricks of the trade."

**Note: We will run this as a single 5 – 6 hour session. It will replace two of our normal lab sessions.**

Week XIV

**Observing a prescribed burn and/or identifying fuel types in the field.**

- This is a field lab, so come prepared.