

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 - pros and cons.

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Lectures:	Tuesday, Thursday	B304: 10:00 - 11:20
Lab:	Wednesday	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 monoclinal 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

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	

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 **Using the tables for the “Canadian Forest Fire Weather Index System.”**
- Week IV **FBP System Field Guide**
- Using the field guide to derive outputs from different input scenarios.
- Week V **Using the FBP and FOFEM computer modelling systems**
- 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.
- First Order Fire Effects Model (FOFEM)**
- Effects of varying flame length on pine versus spruce
- Week VI **Using the FBP computer model**
- The FBP module - wind direction and slope**
- Wind direction and slope
 - Acceleration in slash fuel types
 - Effect of fuel loading on acceleration
 - Combined effects of temperature and RH on ROS
- 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 **Fire behaviour – interactive session with Jeff Henricks (Fire Behaviour Specialist from Alberta L.F.S.).**
- Week X **Seeds released by heat (continue lab VII)**
- Collecting germination results
 - Graphing results (2002 plus previous years)
 - Preparing report
- Week XI **Discussing results and inferences made from lab X**

Week XII Lab exam – assigning fuel types, observation of fire precaution by homes in the urban/wildland interface.

Week XIII Visit to Alberta LFS warehouse and office

- 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.