

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: ENTOMOLOGY/PATHOLOGY

CODE NO.: FOR 121-4 SEMESTER: II

PROGRAM: FORESTRY/ABORIGINAL RESOURCE TECHNICIAN

AUTHOR: S. FISCHER

DATE: AUGUST 1994 PREVIOUS OUTLINE DATED: DECEMBER 1991

APPROVED: R. Bark  
DEAN

Aug 10/94  
DATE



ENTOMOLOGY/PATHOLOGY

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TOTAL CREDIT HOURS: 48

PREREQUISITE(S): NONE

I. PHILOSOPHY/GOALS:

The **Entomology** part of the course focuses on: insect classification, reproduction, damage effect on trees, control - biological and chemical; and interrelationships between insects and disease. The student will study insect problems under hosts, range, life cycle, feeding type and control, with emphasis on the immature (feeding) stage of development.

The purpose of the **Pathology** part of the course is to familiarize the student with forest tree diseases; their identification, life history, control and impact on the practice of forest management.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course participants will be able to:

**Entomology**

1. Identify to a 60% accuracy, 20-30 forest insects of Ontario - Lepidoptera, Coleoptera, Hymenoptera, Diptera, Hemiptera, Homoptera. Under each of the above there would be a specific list of insects, modified annually according to projected forecast.
2. Identify to a 60% accuracy by stating common and/or scientific names of 20-30 forest insects of Ontario by specimens/slide.
3. State the natural succession of insect and disease organisms related to:
  - 1) fire
  - 2) the establishment of monoculture
  - 3) harvesting
  - 4) open spaces
4. Describe the impact of temperature, humidity, precipitation and wind on insect outbreaks and/or natural control.
5. Recognize and/or describe signs and symptoms to a 60% accuracy, injurious forest insects of Ontario by slides/specimens.

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II. STUDENT PERFORMANCE OBJECTIVES: (continued)

Pathology

1. Compare forest and shade tree pathology.
2. Explain the role of tree diseases in natural ecosystems.
3. Explain the importance of tree diseases.
4. Distinguish between the concept of integrated forest management and forest disease management.
5. Distinguish between the concept of tree health and tree diseases.
6. Classify the ten (10) types of forest/shade tree diseases: biotic (infectious), abiotic (non-infectious), decline plant diseases, taxonomic, forest product, part of tree, parasitic vs saprophytic, necrotic vs hypertrophic vs atrophic, by host, non-pathogenic.
7. Identify and describe types of abiotic (non-infectious) stress factors that affect tree health.
8. Identify and describe types of biotic (infectious) stress factors as agents of tree diseases: nematodes, viruses, mycoplasma, bacteria, parasitic flowering plants and fungi.
9. Explain the characteristics that fungi have in common.
10. Draw fully labelled life cycles of at least nine (9) fungus diseases important to Ontario using signs and symptoms: mycorrhizae, foliage, rust, canker, vascular wilt, wood decay, wood stain, root diseases and decline diseases.
11. Illustrate diagrammatically a decline disease of complex biotic (infectious) and abiotic (non-infectious) origin using a specific example.
12. State and explain the natural succession of infectious organisms on a tree, stump or log.
13. Recognize the relationship between and the impact of forest/shade tree disease on the practice of Silviculture:
  - i) List and describe five (5) silvicultural methods for the prevention of forest/shade tree diseases.
  - ii) Describe ways in which forest/shade tree diseases change species composition and resulting economic and aesthetic values with examples of each.

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III. TOPICS TO BE COVERED:

Entomology

Characteristics of Adult Insects

Forest Adult Insect Drawings

Lepidoptera or Conifers

Hymenoptera

Insect Ecology

Coleoptera

Diptera, Hemiptera, Homoptera

Damage and Effect

Insect Control, F.I.D.S.

Broad Leaf Lepidoptera

Urban Forest insects

Pathology

Classification of Forest/Shade Tree

Diseases

Abiotic Stress Factors

Biotic Stress Factors

Introduction to Fungi

Fungi as Agents of Tree Disease

Assignments

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IV. LEARNING ACTIVITIES/REQUIRED RESOURCES:

Entomology

1. List and describe equipment and procedures used in insect population surveys, including traps, foliage, sampling, beater mats.
2. Describe FIDS procedure for collecting, preserving and recording data.
3. Describe methods of damage reduction, e.g. suit sp. to site, discourage monoculture, encourage uneven aged stands, promote vigor.
4. Safe Use of Pesticides.
5. Describe the four methods of remedial action - exclusion, eradication, protection and resistance - and give a specific example of use of each.
6. Describe method by which forest pests change species composition and resulting economic and aesthetic value with three examples of each.
7. Describe and give examples of seven methods of applied biological control, e.g., virus, pheromone, fungi, parasites, predators, bacteria, hormones.
8. Describe and give at least one example for methods of silvicultural control, e.g., prescribed burn, leader clipping, colony control, (multi) culture
9. Describe life cycle of 20-30 forest pests of Ontario. Includes recognition in field and by slide/specimen
10. Shade tree insects - common name - describe:  
host, range, life cycle, feeder types and control, birch leaf skeletonizer, birch leaf miner, eastern tent caterpillar, mountain ash sawfly, mites, aphids, scales, bronze birch borer, carpenter ants

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IV. LEARNING ACTIVITIES: (continued)

Pathology

1. Classify forest shade tree diseases using nine different methods:

- a) taxonomic
- b) biotic (infectious)
- c) abiotic (non-infectious)
- d) decline
- e) forest product
- f) part of tree
- g) parasitic/saprophytic
- h) necrotic/atrophic/ hypertrophic
- i) by host
- j) non-pathogenic

Resources:

Manion, Chapter 1 Unit 1  
Video - Signs & Symptoms

2. Identify and describe types of abiotic (non-infectious) stress factors that affect tree health. Present in the form of a chart having the following headings: Stress Factor, HW/SW, Symptoms, Sketch of Damage Treatment.

Resources:

Manion, Chapter 2,3,4  
Unit 2  
Video - Abiotic Stress Factors

3. Identify and describe types of biotic or infectious forest/shade tree diseases - fungi, bacteria, nematode, virus, mycoplasma, seed plant.

Present in the form of a chart, using the following headings: Size, Shape, Parasitic/ Saprobic, Signs, Symptoms, Spread, Damage, Importance, Method of Reproduction, Control, Example.

Resources:

Manion, Chapters 5,6,7 & 17  
Unit 3

4. Explain the characteristics that fungi have in common.

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IV. LEARNING ACTIVITIES: (continued)

Pathology

5. Describe life cycles of nine (9) biotic (infectious) forest/shade tree diseases of Ontario using signs and symptoms only.
- a) Mycorrhizal Fungi
  - b) Foliage Diseases
  - c) Rust Diseases
  - d) Canker Diseases
  - e) Vascular Wilt Diseases
  - f) Wood Decay
  - g) Wood Stain
  - h) Root Rots
  - i) Decline Disease

Resources:

Manion  
Unit 5

6. State and explain natural succession of infectious (biotic) disease organisms on a tree, stump or log.

Resources:

Class Notes  
Library  
Unit 6  
Manion, Chapter 5, 16  
Video, Signs & Symptoms, Abiotic Stress, Wood Decay

7. List and describe at least five silvicultural methods for prevention of forest/shade tree diseases.

Resources:

Silviculture Study Guide  
Library  
Biology Study Guide  
Manion  
Unit 6

8. Describe ways in which forest/shade tree diseases change species composition, effects on economic and aesthetic values with examples of each.

Resources:

Silviculture Study Guide  
Library  
Biology Study Guide  
Manion  
Unit 6

9. Fungus specimen slide test and specimen test.

Resources:

Videotape

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**V. METHOD OF EVALUATION:**

**Entomology**

Quiz	5%
Assignments	15%
Test	10%
Lab Week	20%
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	50%

**Pathology**

Lab Week	5%
Assignments	25%
Slide Test	10%
Theory Test	10%
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	50%

**Grading:**

- A+ - 90% exceptional
- A - 85% consistently outstanding
- B - 75% above average
- C - 60% basic understanding of course material

**VI. REQUIRED STUDENT RESOURCES:**

Textbook: Insects Harmful to Forest Trees

Lincoff, 1990, "Guide to Mushrooms", Simon and Shuster

Manion, P.D. 1991, "Tree Disease Concepts", 2nd Edition, Prentice-Hall

Fischer, S.S. 1994, "Forest Entomology/Pathology Study Guide", Sault College

**VII. ADDITIONAL RESOURCE MATERIAL:**

VIDEOTAPES - available in Sault College library and on site for distance education.

**VIII. SPECIAL NOTES:**

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.