

Sault College
of Applied Arts and Technology
sault ste. marie

Course Outline

FOREST BIOLOGY

BIO 111-2

revised May, 1977

FOREST BIOLOGY 111-2

An elementary course in biology designed for resource management students. The cellular basis of life - form and function. Differentiation and growth of autotrophs. The energy cycle: food chains, food webs, trophic levels. Catabolic processes of life - nutrition, digestion, respiration. Anabolic processes of life - photosynthesis. Affects of physical environment on plants and animals. Laboratory sessions on alternate weeks.

BIO 111-2

TEXT:

Weisz, P.B. (1971). The Science of Biology
4th Ed. New York. McGraw-Hill 656 p.

REFERENCES:

Galbraith, D.I. and D.G. Wilson, 1966
"Biological Science, Principles and Patterns of Life"
Toronto. Holt, Rinehart and Winston. 753 p.

Speed, F.M. 1965. "New Biology"
Toronto. Ryerson Press. 446 p.

Topic Number	Suggested Periods	Topic Description	Reference
1	2	<u>Introduction to Biological Studies</u> - introduction - characteristics of living matter - requirements for life	Weisz Ch. 2
2	5	<u>The Cell Structure and Function of Typical Cells</u> - levels of organization of matter - cell size structures - cell membrane and material movement through cells - water balance in cells - the microscope and its parts	Weisz P. 67-76 P. 61-64
	5	<u>Differentiation and Growth of Plant Cells and Tissue</u> - review of typical cells - specialized plant cells and tissues - major groups of plants - support in plant stem - dicotyledonous vs monocotyledonous plants - root and stem growth - growth zones of roots and stems - secondary growth - growth of leaves and branches - leaf fall in trees	Weisz Ch. 5 P. 77-81 P. 182-191
3	4	<u>The Energy Cycle</u> - conversion of energy by photosynthesis - carbohydrates - proteins - fats and lipids - trophic levels - basic energy cycle - anabolism and catabolism	Weisz Ch. 6 P. 93-102
4	7	<u>Catabolic Processes of Life</u> - respiration and fuel decomposition - conversion of food molecules - glycolysis - lipid respiration - protein respiration - anaerobic vs aerobic respiration - fermentation	Weisz Ch. 15
5	6	<u>Anabolic Processes of Life</u> - photosynthetic processes - factors affecting photosynthesis	Weisz Ch. 16

Topic Number	Suggested Periods	Topic Description	Reference
6	4	<u>The Physical Environment of Organisms</u> - physical abiotic environments - water cycle - carbon cycle - oxygen cycle - nitrogen cycle	Weisz Ch. 16

UNIT 1 - Introduction to Biological Studies (2 hours)

Performance Objectives:

Using any living organism as an example, to illustrate how it exhibits all the biological characteristics and has all the requirements of any living object.

Assignments:

Read Weiss, Ch. 2 - pp 15 - 22
49 - 65

UNIT 2(a) - The Cell Structure and Function of Typical Cells (5 hours)

Specific Objectives:

1. To demonstrate mastery of the compound microscope and cell structure from animal and plant tissue provided to prepare usable wet mounts of individual cells, identify all component parts on an illustration, and differentiate between the two cell types.

2. Given a list of the components of the hierarchy of levels of organization of matter, the student will be able to draw a chart placing each component in its correct relationship to the others.

3. To distinguish between osmosis, diffusion, active transport and conduction as they apply to living cells.

Assignments:

Read Weiss, pp 67 - 76
61 - 64

UNIT 2(b) - Differentiation and Growth of Plant Cells and Tissue (5 hours)

Specific Objectives:

1. To illustrate by means of a drawing the growth regions and the following components of a woody tree.

2. To write down in concise form a description of the development and functions of the tissues listed above.

Assignments:

Read Weiss, Ch. 5 pp 77-81
182-191

UNIT 3 - The Energy Cycle (4 hours)

Specific Objectives:

1. To distinguish between autotroph and heterotrophs by drawing a four trophic level food chain, food web, ecological pyramid
2. To illustrate metabolic synthesis and decomposition that occur in the energy cycle.

Assignments:

Draw a food chain, web, and pyramid for any four ecosystems eg. - tundra, desert, pond, stream, boreal forest.

UNIT 4 - Catabolic Processes of Life (7 hours)

Specific Objectives:

1. To illustrate in a chart the processes of nutrition and the end products of fuels.
2. To distinguish between glycolysis, fermentation and respiration.
3. To illustrate the process of respiration in a summary diagram, showing the major pathway of carbohydrates, proteins and lipids.

Assignments:

Read Weiss, Ch. 15

UNIT 5 - Anabolic Processes of Life (6 hours)

Specific Objectives:

1. To describe by means of a labelled drawing a summary of the photosynthetic process, including light and dark reaction.
2. To distinguish between photosynthesis and respiration by means of comparative chart.

Assignments:

Read Weiss, Ch. 16

UNIT 6 - The Physical Environment of Organisms (4 hours)

Specific Objectives:

1. To distinguish between synthesis and breakdown processes as revealed in:
 - a. water cycle
 - b. carbon/oxygen cycle
 - c. nitrogen cycle

Assignments:

Read Weiss, Ch. 16 pp 111-131

FOREST BIOLOGY -- BIO 111-2 -- LABORATORY SCHEDULE

- Week 2 - Laboratory 1 - Use of microscopes and preparation of mounts
2 - Examination of prepared plant and animal cells of different types
Sketches required
- Week 4 - Laboratory 3 - Examination of leaf sections
- specialized plant cells
- primary and secondary growth in plants - cross section of roots and stems of various ages
Sketches required
- Week 6 - Laboratory 3 (Cont'd.) - Basic identification of wood type based on cell structure and tissue arrangement
- Week 8 - Laboratory 4 - Tests for various components of living things
- carbohydrates, proteins, lipids
- Week 10 - Laboratory 5 - Movement and transportation of materials
- processes of osmosis, diffusion, and active transport studied in relationship to plant nutrition
- Week 12 - Laboratory 6 - Enzymes - the effect of enzymic activity in nutrition, digestion and photosynthesis
- Week 14 - Laboratory 7 - Review of leaf structure and function
- role of chlorophyll, light and CO₂, in photosynthesis

Students will be evaluated on the following basis.

1. Participation in laboratory sessions and submission of assigned drawings and reports of laboratory observations (see Specific Objectives)
2. Impromptu quizzes during laboratory sessions, based on laboratory observations from the previous week.
3. Term tests on lecture and laboratory material as outlined in specific objectives.

Term test #1 based on units 1 and 2

Term test #2 based on units 3 and 4

Term test #3 based on units 5 and 6

To fulfill the requirements of the course, a passing grade of 60% must be achieved in each of the following:

1. laboratory reports, drawings and quizzes (accumulated mark)
2. term test #1
3. term test #2
4. term test #3