SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON

COURSE OUTLINE

Course Title: LAB RESEARCH TECHNIQUES

Code No.: NRT 321-3 Semester: V1

Program: INTEGRATED RESOURCE MANAGEMENT TECHNOLOGY

Author: Harvey Robbins & Valerie Walker

Date: JAN 2001 Previous Outline Date: NEW

Approved: _____ _____
Dean, Natural Resources Date

Total Credits: 3 Prerequisite(s):
Length of Course: 3 hrs/week X 16 weeks
Total Credit Hours: 48

I. COURSE DESCRIPTION:

This course will consist of a series of modules that are designed to give the student exposure to state-of-the-art equipment and techniques involved in the study of natural resources. Partners from outside the College are expected to participate in the design and implementation of some of these classes. There will be a series of labs and research topics intended to widen the scope of knowledge and skills of the students. Modules will include some of the following: bioassays, wildlife capture and restraint, stomach/scat analysis, aquatic invertebrate collection through the ice, winter severity indices, and aquatic watershed response to forest watershed disturbance.
Data collection, analysis, and report writing will be emphasized.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course the student will demonstrate the ability to:

1. Describe and explain basic ecological principles as related to animal populations

Potential Elements of the Performance:

- discuss ecosystem components and boundaries
- describe the components of and examples from each trophic level
- describe the organisms involved in recycling in ecosystems
- visually describe the flow of energy and nutrients in ecosystems
- express numbers of organisms typically found at each trophic level
- explain the concepts of biomagnification and bioaccumulation and give examples

This learning outcome will constitute approximately 0% of the course.

2. Using pellet and scat analysis, determine the food habits of selected birds and animals.

Potential Elements of the Performance:

- using purchased owl pellets, analyse their contents for evidence of prey eaten

- using bone identification sheets, identify bones of prey eaten
- using a hair identification key, identify species eaten by barn owls
- using hair identification key, determine species of fur bearers from scats of selected predators
- identify vegetative matter remaining in the scat of vegetarians or omnivores
- prepare a technical report, including a food web with identified relationships, on the findings

This learning outcome will constitute approximately 10% of the course.

3. Using stomach contents, determine rodent food relationships in a northern environment.

Potential Elements of the Performance:

- remove and separate identifiable contents of selected rodent/carnivore stomachs
- using a hair identification guide, identify prey species
- using selected references on bones, identify prey species found
- remove wood and other vegetative matter from beaver stomachs
- using a key on wood fibre identification, identify the type of wood eaten by beaver
- prepare a technical report on the findings

This learning outcome will constitute approximately 10% of the course.

4. **Analyse lake trout stomachs to ascertain the ecology of the deep waters of Lake Superior.**

Potential Elements of the Performance:

- make appropriate notes on the ecology of lake trout in Lake Superior as presented to you
- using the specimens provided, identify, enumerate and weigh the prey found in lake trout and whitefish stomachs from Lake Superior
- using a selected set of data, analyze the results of a portion of this study
- prepare a technical report on the ecology of the deep waters of Lake Superior and include the pertinent ecological relationships

This learning outcome will constitute approximately 10% of the course.

5. **Perform a winter lake survey to determine conditions present and the adaptations of invertebrates living there.**

Potential Elements of the Performance:

- determine physio-chemical parameters in the two lake environments
- collect aquatic invertebrates from each of the above environments in both deep and shallow waters
- identify invertebrates as completely as possible
- using appropriate references, determine habitat and trophic relationships (niche) and special adaptations of each organism present and relate to environmental conditions
- estimate number of invertebrates of selected species present in each lake
- prepare a technical report on the findings

This learning outcome will constitute approximately 30% of the course.

6. Use a bomb calorimeter and traditional soil chemistry analyses to estimate energy and nutrient levels in browse selected by herbivores.

Potential Elements of the Performance:

- analyse the caloric value of wildlife browse species from different sites using a bomb calorimeter
- prepare browse sample pellets for combustion
- determine soil pH using a pH meter
- determine soil calcium and magnesium content using an atomic absorption procedure
- prepare calibration curves for parameters to be analyzed
- relate the caloric value of the browse species with the chemical analysis of the soil
- calibrate and standardize instruments required
- prepare a technical report on the findings

This learning outcome will constitute approximately 15% of the course.

7. Use a bioassay analysis to determine the toxicity of a herbicide.

Potential Elements of the Performance:

- prepare samples of a given range of concentrations for testing purposes
- perform a traditional static bioassay using rotenone as a toxin of sideswimmers
- analyze the results of the experiment in the traditional manner by plotting appropriate graphs
- prepare a technical report of the findings along with their significance

This learning outcome will constitute approximately 10% of the course.

8. Determine the role of abiotic factors on the population levels of deer, moose and caribou.

Potential Elements of the Performance:

- using a set of data on a specific wildlife population, summarize using a statistical computer program, and visually present results of your analysis
- relate above results to weather severity index data and draw conclusions on the impact of weather on the population
- present findings orally to classmates

This learning outcome will constitute approximately 15% of the course.

III. TOPICS:

January 3-10 Introduction and basic ecology
- course outline
- animals and their ecological relationships
- review basic ecology
- ecological pyramids
- accumulation of pollutant

Jan. 17 Owl pellet and mammal scat analysis
- scat analysis for prey
- hair identification
- bone identification
- report writing

Jan. 24 Rodent stomach analysis
- dissection of contents from rodent stomachs
- hair identification
- bone identification
- vegetation/wood identification
- report writing

Jan. 31 Lake trout stomach analysis
- ecology of the depths of Lake Superior
- lake trout/whitefish stomach analysis
- ecological relationships in the deep waters of Lake Superior
- technical report

Feb. 7, 14, 21 Winter Lake Survey
- comparison of two lakes in winter condition
- determination of physio-chemical conditions
- quantitative collection of aquatic invertebrates
- identification of collected specimens
- invertebrate adaptations
- population estimations
- technical report

Feb. 28, March 7 Bomb Calorimetry/Soil Analysis-browse samples
- comparison of caloric value of browse species from different sites
- pellet preparation
- detemination of soil pH, calcium and magnesium
- calibration curves and sample dilutions
- instrument calibration
- technical report

March 21 Bioassay –herbicide toxicity
- preparation of various concentrations in preparation for bioassay
- operation of a static bioassay
- analysis of bioassay results
- technical report

April 12 Abiotic Factors
- winter severity index record

- response of wildlife populations to climatic extremes
- **presentations** on findings

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Lab Research techniques NRT 321 Laboratory Manual

All other resources needed will be provided or obtained from library sources

V. EVALUATION PROCESS/GRADING SYSTEM

Students are to work in groups of no more than three. Once a group has been formed, the member's names will be recorded for each project by the instructor. No changes will be permitted unless agreed to by the instructor and all members of the group. Evaluation will be based on the following:

Lab Reports/Assignments 100%
(see breakdown in outline above and lab manual)

All assignments and the presentation **must** be completed for course credit. Grades for late assignments will be reduced 10% per day late. Assignments due during the semester will **not** be accepted at semester end for course credit.

Students missing a laboratory/field trip without a provable documented valid reason will be assigned a group for report writing purposes and will receive only 50% of the grade the other group members receive.

Method of Assessment (Grading Method) The following letter grade will be assigned:

A+	Consistently outstanding	(90% - 100%)
A	Outstanding achievement	(80% - 89%)
B	Consistently above average achievement	(70% - 79%)
C	Satisfactory or acceptable achievement in all areas subject to assessment	(60% - 69%)
R	Repeat -- The student has not achieved he objectives of the course and the course must be repeated.	(Less than 60%)
CR	Credit exemption	
X	A temporary grade, limited to situations with extenuating circumstances, giving a student additional time to complete course requirements.	

VI. SPECIAL NOTES:

Special Needs

If you are a student with special needs (e.g. Physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717 or 491 so that support services can be arranged for you.

Plagiarism

Students should refer to the definition of "academic dishonesty" in the "Statement of Students Rights and Responsibilities".

Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course, as may be decided by the professor.

In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Advanced Standing

Students who have completed an equivalent post-secondary course should bring relevant documents to the Coordinator, Natural Resources Programs.

Retention of Course Outlines

It is the responsibility of the student to retain all course outlines for possible future use in gaining advanced standing at other post-secondary institutions.

Substitute course information is available at the Registrar's Office.

VII. PRIOR LEARNING ASSESSMENT:

Please contact the Prior Learning Assessment Office (E2203) for further information.