SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: AQUACULTURE

CODE NO.: FOR341 **SEMESTER:** VI

PROGRAM: INTEGRATED RESOURCE MANAGEMENT TECHNOLOGY

AUTHOR: SHARON CUDDY

DATE: JANUARY 1999 **PREVIOUS OUTLINE DATED:** JAN '96

APPROVED: _____ _____
DEAN DATE

TOTAL CREDITS 3
PREREQUISITE(S): None
LENGTH OF COURSE: 3 hrs/week x 16 weeks
TOTAL CREDIT HOURS: 48

I. COURSE DESCRIPTION:

This practical course will introduce the student to aquacultural practices and fish hatchery management. Principal emphasis is placed on the culture of coldwater finfish species such as trout and salmon. Fish culture requirements including water quality and quantity, egg sources, collection and incubation, and early and late rearing facilities are studied. Hatchery operation and record keeping, fish nutrition and feeding, management for fish health and brood stock management are also discussed. Each student will undertake an independent literature search of current practices, advances, and initiatives in the field of aquaculture and present their findings to the class. The traditional classroom environment is also supplemented with a work practicum at a fish hatchery. The student will provide a verbal and written report based on a specific instructor-approved aspect of the hatchery's operation.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1) **Describe requirements necessary for the efficient operation of a fish culture operation.**

Potential Elements of the Performance:

- Know physical and chemical characteristics (such as temperature, dissolved gases, suspended and dissolved solids, turbidity, pH, mineral content, and the potential danger of toxic materials) and their effect on water quality in a fish culture operation.
- Describe the pros and cons of various sources of water supply.
- Identify the three points at which water may need to be treated as it passes through a fish hatchery.
- Describe the design of a hatchery based on various primary purposes with consideration given to the types of buildings, egg incubation facilities, and rearing facilities required.
- Identify criteria and considerations in the selection and layout of a cage culture facility.
- Summarize the rearing unit characteristics for fish hatcheries.
- Design a hypothetical rearing program based on biological criteria.

This learning outcome will constitute approximately 8% of the course's grade.

2) **Describe production methods employed in the management of a fish culture operation.**

Potential Elements of the Performance:

- Know proper feeding practices of fish stock.
- Determine growth projection based on length-weight relationships, growth rate, temperature, and carrying capacity.
- Identify inventory methods used for determining weight data.
- Identify concerns and procedures associated with fish grading, handling and harvesting.
- Recognize the importance of sanitation in rearing unit management.
- List the factors that should be considered for efficient record-keeping.

This learning outcome will constitute approximately 4% of the course's grade.

3) **Describe the procedures involved in broodstock, spawning, and egg handling.**

Potential Elements of the Performance:

- Determine the quantity and quality of broodstock required for efficient operation of a fish rearing facility.
- Identify practices associated with the acquisition and care of broodstock.
- Recognize factors associated with selective breeding practices.
- Describe methods of spawning broodstock / wildstock and details of egg handling and egg incubation.

This learning outcome will constitute approximately 8% of the course's grade.

4) **Identify nutritional requirements which influence optimal growth and health of fish in a rearing facility.**

Potential Elements of the Performance:

- Know nutritional requirements of fish, including necessary dietary levels of protein, carbohydrate, lipid, vitamins, minerals, fiber, and non-nutrients.
- Identify physiological functions (maintenance, growth, activity, reproduction, etc.) and other environmental factors which influence fish nutrition requirements.
- Identify the sources and different types of feed, its handling and storage, feeding guidelines, and procedures used to evaluate feed performance.

This learning outcome will constitute approximately 7% of the course's grade.

5) **Identify issues associated with fish health management.**

Potential Elements of the Performance:

- Recognize signs and symptoms of common fish diseases / parasites in coldwater hatcheries and prescribe treatment / elimination of the offending organism(s).
- Be familiar with the methods of treatment, including the chemicals and their uses.
- Understand the procedures involved in hatchery decontamination.
- Prepare and ship diseased specimens for analysis.

This learning outcome will constitute approximately 7% of the course's grade.

6) **Employ appropriate equipment, timing and handling methods in the movement of hatchery fish for stocking or food industry purposes.**

Potential Elements of the Performance:

- Be familiar with different types of transportation equipment.
- Recognize the factors which may contribute to fish mortality during transfer.
- Employ proper handling, loading, and stocking methods in order to minimize increased stress levels.

This learning outcome will constitute approximately 3% of the course's grade.

7) **Investigate warmwater finfish species production.**

Potential Elements of the Performance:

- Describe methods used in the incubation and rearing of warmwater and baitfish species for distribution to various markets.

This learning outcome will constitute approximately 3% of the course's grade.

8) **Evaluate the current status of different aspects of aquaculture at the global, national, and/or provincial levels.**

Potential Elements of the Performance:

- Research and submit three brief reports (one page summaries) based on three current affairs, news headlines and/or innovative advances in the field of aquaculture. Topics of research might include changes in Canadian legislation, technological advances in fish production, new fish species, sources of supplies, etc. Sources of information might include internet sites, magazines, newspapers, etc. and must be referenced. Downloaded print-outs of internet information or photocopied articles should be included with the summary.

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

9) **Perform a field placement in a fish hatchery.**

- Provide a minimum of 15 -20 volunteer placement hours in a fish hatchery.
- Provide a verbal and written report based on a specific (instructor-approved) aspect of the hatchery's operation.

This learning outcome will constitute approximately 45% of the course's grade.

III. TOPICS:

1) Hatchery Requirements
2) Hatchery Operation
3) Broodstock, Spawning and Egg Handling
4) Nutrition and Feeding
5) Fish Health Management
6) Transportation and Stocking of Hatchery Stock
7) Production of Warm Water Fishes
8) Independent Research of Current Affairs in Aquaculture
9) Field Placement and Technical Report*

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***TECHNICAL REPORT REQUIREMENTS:**

A technical report of approximately five pages (typewritten - double spacing) is required on one of the topics listed below. Each student will select a different topic and apply this to their placement hatchery. Two students may select the same topic but each will discuss it in relation to a different hatchery.
The format for technical reports required for co-op reports will be used as the marking criteria for this assignment.

Each report will include the following:

- occurrence/practice/problems/applicability to the local hatchery selected
- local attempts to correct the problem(s) or to use the recommended methods/formula
- your assessment of their success or lack of success
- your recommendations on how the hatchery involved should change their present practices related to your topic
- a one page summary of the report contents and findings for distribution to classmates

Topic Listing

Quality of Incoming Water (except temperature)
Water Temperature
Effluent Treatment
Hatchery Record Keeping
Production Methods (capacities, growth, variation in size, etc.)
Broodstock Care and Maintenance
Egg Sources and Collection Methods
Egg Incubation and Handling (to swim-up stage)
Transportation and Stocking Methodology
Fish Disease(s)
Fish Parasite(s)
Nutrition and Feed Supply

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Castledine, A.S. 1988. Aquaculture in Ontario. Revised 1988. Toronto, Ministry of Natural Resources, Ministry of Agriculture, Food and Ministry of Environment. 80pp.

- handouts provided by the instructor

ADDITIONAL RESOURCES

- see Appendix A of this Course Outline

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V. EVALUATION PROCESS/GRADING SYSTEM

1. Work Performance Evaluation (by hatchery representative)	20%
2. Technical Report	15%
3. In class Presentation of Topic	10%
4. Current affairs in aquaculture assignment	15%
5. Term Tests (2) Based on lectures, field trips, presentations, current affairs assignment, etc.	40%
	100%

NOTE: STUDENT MUST SUCCESSFULLY COMPLETE EACH OF THE FIRST THREE ACTIVITIES FOR A PASSING GRADE.

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

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	3.75
B	70 – 79%	3.00
C	60 – 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit exemption	
X	A temporary grade – limited to situations with extenuating circumstances giving a student additional time to complete the requirements.	

VI. SPECIAL NOTES:

- **Special Needs**
  If you are a student with special needs (eg. 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, 491 so that support services can be arranged for you.

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

- **Course Modification**
  The instructor reserves the right to modify the course as deemed necessary to meet the needs of students.

- **Plagiarism**

  Students should refer to the definition of "academic dishonesty" in the Statement of Student 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.

VII. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following: