COURSE TITLE: AQUACULTURE

CODE NO.: NRT 209        SEMESTER: IV

PROGRAM: FISH & WILDLIFE TECHNICIAN

AUTHOR: H. ROBBINS/ V. WALKER

DATE: JAN. 2005   PREVIOUS OUTLINE DATED: JAN. 2004

APPROVED: ___________________________ DEAN ___________________________ DATE

TOTAL CREDITS: 3

PREREQUISITE(S): NONE

HOURS/WEEK: 3

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For additional information, please contact Colin Kirkwood, Dean School of Technology, Skilled Trades & Natural Resources (705) 759-2554, Ext.688
I. COURSE DESCRIPTION:

This course concentrates on the methods and equipment used in the culture of cold-water fish such as trout and salmon. Hatchery 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. The classroom environment is supplemented with videos and on site visits to area hatcheries. Students will prepare a technical report on a specific problem associated with hatchery fish production, stocking or survival.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Beneficially apply his/her aquaculture knowledge in the location and design of aquaculture facilities.

Potential Elements of the Performance:

- describe the importance of aquaculture and the species raised in Canada and Ontario
- describe water quality requirements for cold water hatchery location
- describe treatment methods for problems with incoming water supply and for water supply reuse
- describe requirements and methods for treatment of hatchery effluent
- describe the general layout of hatchery buildings
- describe layout of egg incubation facilities and type and layout of rearing facilities
- describe the use of cages to rear cold water fish

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

2. Apply his/her knowledge in the correct operation of coldwater aquaculture facilities.

Potential Elements of the Performance:

- describe the significance of the length-weight relationship
- diagram the relationship between growth and water temperature
- discuss the concept of carrying capacity in rearing facilities
- explain methods of doing inventories of eggs and fish
- explain proper methods of grading fish, handling and harvesting
• describe the necessary procedures in management of the rearing unit including cleaning and disinfection.
• explain general record-keeping procedures and the need for them.

This learning outcome will constitute 15% of the course’s grade

3. Discus the various aspects of brood stock management.

Potential Elements of the Performance:

• describe the acquisition and care of broodstock
• describe methods of selective breeding of broodstock
• describe procedures used for artificial spawning/insemination
• describe methods of controlling spawning time in broodstock

This learning outcome will constitute 10% of the course’s grade.

4. Describe the stages of egg development and implications for handling and care.

Potential Elements of the Performance:

• describe the stages in egg development
• explain factors which affect egg development
• describe egg enumeration and sorting methods
• describe methods of egg disinfection
• describe the transportation of eggs
• describe the advantages of major types of incubators

This learning outcome will constitute 10% of the course’s grade.

5. Describe the important nutritional requirements of fish, feed sources types and feeding protocol.

Potential Elements of the Performance:

• describe factors influencing nutritional requirements of fish
• state the important nutritional requirements of fish
• describe feed sources
• describe proper feed handling and storage
• describe proper feeding protocol

This learning outcome will constitute 20% of the course’s grade
6. **Recognize signs and symptoms of common fish diseases/parasites in cold water hatcheries and determine the prescription for control.**

Potential Elements of the Performance:

- describe the major disease organisms of hatchery fish associated symptoms and treatment with each.
- explain the relationship between stress with disease
- explain methods of equipment and hatchery decontamination
- describe the preparation and treatment of diseased specimens for analysis

*This learning outcome will constitute 20% of the course’s grade.*

7. **Employ appropriate equipment, timing and handling methods in the transportation of hatchery fish to be stocked.**

Potential Elements of the Performance:

- describe types of transportation equipment
- explain water quality requirements
- describe the proper loading, handling and stocking of fish
- describe the use of anesthetics to control stress
- describe the proper timing of stocking procedures

*This learning outcome will constitute 10% of the course’s grade.*

### III. TOPICS:

1. Importance and species raised and location, design and layout of cold water aquaculture facilities.
2. Operation of aquaculture facilities.
4. Egg development and care.
5. Nutrition and feeding of fish
6. Parasites/diseases and their symptoms and treatment
7. Handling and movement of hatchery fish
IV. REQUIRED RESOURCES/TEXTS/MATERIALS:


Traditional lecture/discussion in a classroom setting for each topic will be supplemented with slides and videos. Reference texts are available on reserve in the library. Two or three field trips to view aquaculture facilities in the region will be provided.

Students will do short technical reports on each of the tours and will do one page summaries of each video presentation.

V. EVALUATION PROCESS/GRADING SYSTEM

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<table>
<thead>
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<tbody>
<tr>
<td><strong>Unit Tests (3)</strong></td>
<td>75%</td>
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<tr>
<td>(based on lectures, field trips, videos)</td>
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<tr>
<td><strong>Field Trip Reports</strong></td>
<td>15%</td>
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<td>(must attend to submit report)</td>
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<tr>
<td><strong>Summaries of videos</strong></td>
<td>10%</td>
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<tr>
<td><strong>Technical Report</strong></td>
<td>(15%)</td>
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<td>100%</td>
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* Note: Technical report is optional for those students who want to reduce the value of their term tests to 60% from 75%. Report format and topics will be made available early in the semester.

Assignments and report values will be reduced at a rate of 10% per day for late submissions for a period of 5 days after the due date. After 5 days lab assignment/report value will be zero.

All assignments must be submitted regardless of lateness to pass the course. Field trips and/or tests missed without documented health or personal reasons will be valued at zero.
The following semester grades will be assigned to students in postsecondary courses:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
<th>Grade Point Equivalent</th>
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<tbody>
<tr>
<td>A+</td>
<td>90 - 100%</td>
<td>4.00</td>
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<tr>
<td>A</td>
<td>80 - 89%</td>
<td>4.00</td>
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<tr>
<td>B</td>
<td>70 - 79%</td>
<td>3.00</td>
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<tr>
<td>C</td>
<td>60 - 69%</td>
<td>2.00</td>
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<tr>
<td>D</td>
<td>50 - 59%</td>
<td>1.00</td>
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<tr>
<td>F (Fail)</td>
<td>59% and below</td>
<td>0.00</td>
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<tr>
<td>CR (Credit)</td>
<td>Credit for diploma requirements has been awarded.</td>
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<tr>
<td>S</td>
<td>Satisfactory achievement in field/clinical placement or non-graded subject area.</td>
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<tr>
<td>U</td>
<td>Unsatisfactory achievement in field/clinical placement or non-graded subject area.</td>
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<tr>
<td>X</td>
<td>A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.</td>
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<tr>
<td>NR</td>
<td>Grade not reported to Registrar's office.</td>
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<tr>
<td>W</td>
<td>Student has withdrawn from the course without academic penalty.</td>
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VI. SPECIAL NOTES:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493 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 postsecondary institutions.
Plagiarism:
Students should refer to the definition of “academic dishonesty” in 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/program, as may be decided by the professor/dean. 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.

Course outline amendments:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean’s secretary. Students will be required to provide a transcript and course outline related to the course in question.

AQUACULTURE/NUTRITION REFERENCES


Stroud, R.H. (ed). 1986. Fish Culture in Fisheries Management. AFS, Bethesda, Maryland.


FISH DISEASE REFERENCES

GENERAL


BACTERIAL AND FUNGAL (see also GENERAL references above)


VIRAL (see also GENERAL references above).


PARASITIC (see also GENERAL references above).


NUTRITIONAL


ENVIRONMENTAL AND EFFECTS OF ENVIRONMENT ON INFECTIOUS DISEASES

(see also GENERAL references above).


AQUACULTURE BUSINESS


NOTE: Most of the above references are found in the library - in the stacks, in reference or on reserve at the front under your instructor's name and the course number. Other faculty may also have some office copies if required.