BIOL 372 – Freshwater Fish Culture
Spring 2010

Instructors

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Course website: www.lssu.edu/faculty/gsteinhart/GBS-LSSU/BIOL372-Fish%20Culture

Meeting Times

Lecture: 2:00-2:50 PM, Wednesday and Friday, 258 Crawford Hall Lab: 2:00-4:50 PM, Thursday, 258 Crawford Hall or Aquatic Research Laboratory

Office Hours

Dr. Steinhart: Monday and Tuesday, 9-11 AM, Wednesday 3-5 PM. Please feel free to stop by my office anytime – knock if my door is closed. Other meeting times can be arranged as needed.

Dr. Li: Office hours TBA.

Course Description

Freshwater Fish Culture will cover principles of operating a freshwater aquaculture program. This includes water quality needs and monitoring, fish feeding and nutrition, fish development and rearing, fish disease diagnosis and treatment, brookstock management, purposes and examples of aquaculture systems, and the ecological and social aspects of aquaculture.

Learning Outcomes and Assessment

- Discover why and how people raise fish for commercial and management purposes (assessment: exams, lab practicals)
- Study the basics of water quality, nutrition, and disease management in rearing programs (assessment: exams, lab practicals, homework assignments)
- Review the ecological effects of aquaculture programs (assessment: exams)
- Learn how to operate and maintain an aquaculture program (assessment: exams, lab practicals, homework assignments)
- Improve communication skill through report writing and class discussions (assessment: research report, class presentation and participation)

Readings

All readings are available on the course web site:
www.lssu.edu/faculty/gsteinhart/GBS-LSSU/BIOL372-Fish%20Culture.html

Participation and Conduct

Learning is an active process, so participation is very important for your success in this course and your future career. Attendance is mandatory for all scheduled laboratory periods, unless listed as optional, and **I expect to be notified in advance if you are unable to attend a lab period**. You will be graded on your participation (50 points, 5% of your grade), so speak up, be courteous, and be active. Use of mobile phones will not be allowed in class!

I want the class to be an open forum for discussion and learning: ask questions! If you are wondering about something, odds are there are other students wondering the same thing. Be critical evaluating what you hear and read, but all students are expected to treat all students and lecturers with respect: do not interrupt somebody or make fun of someone's comment or question.

Special Topic Research Paper and Lecture:

You will write a paper and lead a class discussion on an aquaculture issue of your choice. Examples of possible topics include: pollution from fish culture, selective breeding, ecological consequences of stocking, vertebrate predation at hatcheries, genetic issues in captive broodstock programs, expanding fish culture programs in developing nations, etc. Browse the North American Journal of Aquaculture, your readings, or talk with Dr. Steinhart for ideas. **You must choose your topic by 5 February**, when you must turn in a written copy of your topic (a couple sentences describing what you will study).

Your paper must use peer-reviewed literature for background and discussion. **You must include at least five peer-review references (NO internet references allowed!)**. **A partial list (minimum of five references) is due on 19 February**. Having five references for your final paper is a bare minimum: you should thoroughly explore the literature to find papers related to your topic. Your references must come from peer-reviewed journals and/or agency reports. If you find an agency report on the web, you may use it, but make sure to cite it as if you had the original document. Try going to journal web sites and searching the contents of each journal. You may not be able to access the article online, but you can inter-library loan papers you find on the journal web sites. Again, ask me if you are having any trouble finding papers.

Your final paper is due 26 March. Your paper must be at least 5-pages long and no more than 8 pages (with 1" margins, double-spacing, 12 pt. times or times new roman). Follow TAFS format for citations unless you have a different format approved by me. **See the writing tips and TAFS formatting instructions** on the course web site.

Each student will provide **a peer review of another student's paper, due 2 April**. If you chose, you may revise your paper and earn up to 10 extra points. **Revisions are due 14 April**.

Finally, you will choose a representative paper (from your citations) for the class to read prior to leading a discussion on your chosen topic. You must notify me of the paper to be discussed when you turn in your final paper (26 March). It is recommended that you start your discussion with a short presentation on the topic (using the computer or the board for assistance) and, then, be prepared to stimulate discussion with your fellow students.

Grading

Grades will be scored without curving as:

100 ≥ A+ ≥ 98	90 > B+ ≥ 88	80 > C+ ≥ 78	70 > D ≥ 60
98 > A ≥ 92	88 > B ≥ 82	78 > C ≥ 72	60 > F
92 > A- ≥ 90	82 > B- ≥ 80	72 > C- ≥ 70	

All written and lab assignments are due at the start of the period. If you cannot take an exam or turn in an assignment on time because of illness or emergency, it is your responsibility to contact me as soon as possible: except for unusual circumstances, I expect to be notified before the exam or due date. **Late assignments will be docked 10% of the point value for each late day, except at my discretion when there is a documented reason for the medical or personal emergency.**

Honor system

All assignments are to be entirely your own work, unless you are specifically told otherwise. All aspects of your course work are covered by the Honor system. Any suspected violation (e.g., cheating, plagiarism) will be promptly reported and appropriate action(s) will be taken according to Lake Superior State University policies. The faculty and students of LSSU will no tolerate any form of academic dishonesty.

The Americans with Disabilities Act & Accommodations

In compliance with Lake Superior State University policies and equal access laws, disability-related accommodations or services are available to students with documented disabilities.

If you are a student with a disability and you think you may require accommodations you must register with Disability Services (DS), which is located in the KJS Library, Room 130, (906) 635-2355 or x2355 on campus. DS will provide you with a letter of confirmation of your verified disability and authorize recommended accommodations. This authorization must be presented to your instructor before any accommodations can be made.

Students who desire such services should meet with instructors in a timely manner, preferably during the first week of class, to discuss individual disability related needs. Any student who feels that an accommodation is needed – based on the impact of a disability – should meet with instructors privately to discuss specific needs.

IPASS (Individual Plan for Academic Student Success)

If at mid-term your grades reflect that you are at risk for failing some or all of your classes, you will be contacted by a representative of IPASS. The IPASS program is designed to help you gain control over your learning through pro-active communication and goal-setting, the development of intentional learning skills and study habits, and personal accountability. You may contact 635-2887 or email ipass@lssu.edu if you would like to sign up early in the semester or if you have any questions or concerns.

Assignments and due dates

Due date	Assignment	Point value
Feb. 4	Homework 1	50
Feb. 5	Research topic due	10
Feb. 11	Homework 2	50
Feb. 12	Lecture exam 1	100
Feb. 19	References due	15
Mar. 11	Lab exam 1	50
Mar. 19	Lecture exam 2	100
Mar. 25	Homework 3	50
Mar. 26	Research report	100
Apr. 2	Peer review	50
Apr. 14	Revised report	Up to 10 extra
Apr. 22	Lab exam 2	100
TBA	Class presentation/discussion	100
TBA	Final exam	100
All term	Class participation	50
	TOTAL	**925**

Tentative Laboratory Outline

Topic/Activity	Date	Assignment
Lab introduction and ARL tour	Jan. 14	Review ARL Manual
Egg enumeration and care	Jan. 21	
Volume and flow estimation	Jan. 28	Homework 1
Biomass and feed conversions	Feb. 4	Homework 2, read FCR
Water quality	Feb. 11	
Dissolved gasses	Feb. 18	
Fish health/hatchery operations	Feb. 25	
Lab exam 1	Mar. 11	
Length, weight, and condition	Mar. 18	Homework 3
Internal and external disease examination	Mar. 25	Read IFHM Chapter 3
Bacterial examination	Apr. 1	
Fish health diagnosis	Apr. 8	
Field trip – Oden State Fish Hatchery	Apr. 15	
Lab exam 2	Apr. 22	

Lecture Outline

Topic	Date	**Readings** (all online except IFHM)
INTRODUCTION		
Introduction and origins of aquaculture	Jan. 13	
History and business aspects of aquaculture	Jan. 14	pp. 4-10 and 44-48 in Klontz 1991, Introduction
WATER QUALITY AND SOURCE		
Water temperature and dissolved gasses	Jan. 20	Water quality
Acidity, alkalinity, hardness, and salinity	Jan. 22	Water quality
Nutrients, suspended solids, and particulates	Jan. 27	Water quality
Water sources, delivery, and treatment	Jan. 29	Water quality
FISH GROWTH AND NUTRITION		
Fish nutrition	Feb. 3	Fish feeding
Fish feed formulation	Feb. 5	Fish feeding
Fish feeding	Feb. 10	Fish feeding
Lecture exam 1	Feb. 12	
AQUACULTURE SYSTEMS		
Ranching and ponds	Feb. 17	Pond culture
Cages and pens	Feb. 19	Cage culture
Raceways	Feb. 24	
Recirculating systems	Feb. 26	Recirculating culture
FISH REARING		
Spawning and fertilization	Mar. 10	Egg take
Eggs and larval care	Mar. 12	Egg take
Transport	Mar. 17	Transport
Lecture exam 2	Mar. 19	
FISH HEALTH MANAGEMENT		
Disease diagnosis	Mar. 24	IFHM Chapters 1-2, Fish health
Parasites and environmental diseases	Mar. 26	IFHM Chapters 5 and 8
Bacteria, viruses, and fungi	Mar. 31	IFHM Chapters 4, 6, and 7
Disease treatment	Apr. 2	Chemical treatment
GENETICS AND BREEDING		
Genetics and broodstock	Apr. 7	pp. 53-65 and 73-87 in Genetic Guidelines
Hatchery selection	Apr. 9	Arkai et al. 2007
STUDENT SELECTED TOPICS		
Student-led discussion	Apr. 14	TBA
Student-led discussion	Apr. 16	TBA
Student-led discussion	Apr. 21	TBA
Student-led discussion	Apr. 23	TBA
Final lecture exam	TBA	