

**ENR 5355 Aquaculture
Spring Semester 2022**

Time and Place:

Lectures: Wednesday	11:30-1:20	116 Kottman Hall
Laboratory: Monday	9:10-12:10	333C and 120 Kottman Hall

Instructor:

Dr. Konrad Dabrowski
Office: Room 473D, Kottman Hall
Office Phone: (614) 292-4555
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Graduate Teaching Assistant:

Kevin Fisher Fisher.645@osu.edu
Office: Room 120, Kottman Hall
office hours by appointment.

Instructor's Office Hours: *By appointment.*

Description:

This course is the overview of physical, biological and economic factors that influence the development of fish culture systems. Current world and US fish production practices will be compared. Emphasis will be given to propagation and nutrition of fish produced for human food and recreation and those subjects of conservation efforts.

Course Objectives:

1. Gain proficiency with identification of production facilities used in aquaculture worldwide and be able to characterize their operation features and environmental concerns.
2. Acquire general and specialized knowledge of biology, physiology, nutrient requirement, reproduction or diseases of selected North American and worldwide cultured fish species.
3. Gain practical knowledge and understanding of some basic procedures commonly used in aquaculture practices, such as gametes handling, larval and juvenile rearing, feeding protocols, blood sampling, etc

Required Texts:

There is no textbook that you are required to purchase for this course. Required readings for each lecture will be posted to Carmen weekly modules as scanned PDFs. Recommended/supplemental readings will also be posted.

Texts we will be drawing readings from include:

- Stickney, R.R. 1994. Principles of aquaculture. J. Wiley & Sons, New York
- Boyd, C.E. 1979. Water Quality in warm water fish ponds. Auburn University, Craftmaster Printers, Inc.
- McLarney, W. 1987. The Freshwater Aquaculture Book. Hartley and Marks, Inc.
- Smith, L. 1982. Introduction to Fish Physiology. T.F.H. Publications, Inc.
- Bardach, J. E. et al. 1972. Aquaculture. The Farming and Husbandry of Freshwater and Marine Organisms. Wiley Interscience, New York.
- Huet, M. 1986. Textbook of fish culture. Breeding and cultivation of fish. Fishing News Books Ltd.
- Piper, R.G. et al. 1983. Fish Hatchery Management. U.S. Dept. of Interior, Fish and Wildlife Service, Washington.
- Tyther, P. and P. Colow. (Eds.) 1985. Fish energetics. New perspectives. Croom Helm, London.
- Lovell, R.T. 1988. Nutrition and feeding of fish. AVI Book Van Nostrand Reinhold, New York.
- Webster, C.D. and Lim, C.E. 2002. Nutrient requirements and feeding of fish for aquaculture. CABI Publ., Oxon and N.Y.

Student Evaluation:

<i>Assignment</i>	<i>Course points</i>
Lecture Quizzes	150
Lab Assignments & Attendance	200
Mini Article Presentation	50
Midterm Exam	150
Team Research Project Presentation	100
Team Research Project Report	150
Oral Final Exam	200
Total	1000

Lecture quizzes: 5 lecture quizzes will be given via Carmen throughout the semester. Quizzes will be posted Friday mornings at 9am and must be completed by 11pm that same day. Each quiz will be worth 30 points. Lecture quizzes should be completed independently (students are NOT permitted to work together on lecture quizzes). Students suspected of cheating will be reported to Student Conduct.

Attendance:

Attendance will be taken at every laboratory class (Mondays) and randomly throughout the semester during lecture (Wednesdays). Only absences that fall under university accepted excused absences will be approved.

Laboratory:

Due to the nature of the laboratory component and the expectations of the course, students who attend less than 60% of laboratory days will not be able to successfully complete the research projects and therefore, will not pass the course. Grading for lab includes both attendance which will count for 100 points and four lab assignments throughout the semester each worth 25 points.

Teams of 3-4 students will be formed around the three proposed research topics listed below for the group research projects. Each team will be conducting separate projects on one of these general topics. Each research project will be directly guided by Dr. Dabrowski and/or responsible graduate students within the aquaculture laboratory. Teams are expected to conduct project work during lab sessions each Monday; however, working with live animals will require students to commit time outside of Monday's scheduled lab period as well in order to complete research objectives.

The groups will prepare an oral presentation to be given on the last day of lab, as well as a written project report, on the research that they have conducted on their project at the end of the semester.

Students are expected to bring a laptop/tablet to each laboratory session.

Lab assignments:

There will be several lab assignments over the course of the semester. **All lab assignments will be due before the start of your lab section the following week** (before 9:00am Monday) **and submitted via Carmen.** Details for each assignment will be posted to Carmen. Assignments will include quizzes, worksheets, reports, and "updates" on the progression of each student's aquaculture research project. Each lab assignment will be worth a different number of points. Students are permitted to work together on lab assignments but must submit their own, independent work, written in their own words.

Lab Attire: Open-toed shoes may not be worn in the lab. Students will be required to wear a white laboratory coat while working in the lab. Lab coats are available for your use, though you are welcome to bring your own as well. If other protective wear is needed (goggles, chemical safety masks), they will be provided in the lab as well.

Projects Proposed:

1. Induction of polyploidy in zebrafish (*Danio rerio*) and evaluation of survival and growth over 21 days of rearing
2. Nutritional study on starter diet acceptance and performance (growth, survival, deformity) of zebrafish (*Danio rerio*) fed different live or dry diets over 21 days of rearing

- Investigation of temperature impacts on the rate of mitotic divisions following fertilization in zebrafish (*Danio rerio*).

***Please be aware that these projects involve live fish and that project topics are subject to change depending on the availability and readiness of the live fish the project aims to work with.*

Peer Evaluations: Each student will conduct peer evaluations for each of their project team members for both the Research and Review projects to ensure that each team member is contributing to the group projects. In addition, graduate student mentors guiding each project will also complete an evaluation of each student. Peer and mentor evaluations will be considered when assigning grades for the Research and Review projects for each individual student. Failure to complete peer evaluations will affect these grades as well.

Graduate Student Research Mentors:

Kevin Fisher fisher.645@osu.edu

Postdoc Research Mentors:

Dr. Mackenzie Miller miller.5039@osu.edu

Late Assignments:

The penalty for late assignments is 10% of the assignment total per day. We will not extend deadlines for any reason. There should be extenuating circumstances for missing a scheduled activity or exam. In these cases, early arrangements will need to be coordinated.

****IMPORTANT:** You must contact the instructor PRIOR TO a planned conflict to make arrangements for modified deadlines. Otherwise, no arrangements will be made. If you are ill the day of an assignment/exam, you must reach out to the instructors with verification of your absence on the day of the missed deadline, otherwise no accommodations will be made. If you would like any clarification on this, don't hesitate to reach out.

Letter grades will be assigned on the four-point system following the university's standard scheme:

A	93.00–100 %
A-	90.00–92.99 %
B+	87.00–89.99 %
B	83.00–86.99 %
B-	80.00–82.99 %
C+	77.00–79.99 %
C	73.00–76.99 %
C-	70.00–72.99 %
D+	67.00–69.99 %
D	60.00–66.99 %
E	< 60.00 %

Students with disabilities:

All students with disabilities who need accommodation should see Dr. Dabrowski privately in his office to make arrangements. Special needs must be discussed and arrangements made well in advance (preferably during the first week of the semester) of when they are required. Special accommodations may be arranged through the OSU Office of Disability Services.

Proposed Course Schedule:

Week	Date	Day	Topic	Assignments
Week 1	1/10	Monday	Introduction to course and research project Aquaculture 1: definition and benefits; Current technologies and terminologies	Carmen Quiz: Research topic preference (due: 1/11 11pm) Lab assignment 1 - artemia
	1/12	Wednesday	Live feeds in aquaculture hatchery, brine shrimp (<i>Artemia</i>) and rotifer (<i>Brachionus</i>) biology	Research project groups will be assigned (1/14)
Week 2	1/17	Monday	MLK Day Observed, no class	
	1/19	Wednesday	Aquaculture 2: World and U.S. aquaculture	
Week 3	1/24	Monday	Zebrafish reproduction & development demonstration	Lab assignment 1 – Artemia due 1/24 (9 am) Lab assignment 2 – Zebrafish
	1/26	Wednesday	Zebrafish	Lecture quiz 1 – due 1/28 (11pm)
Week 4	1/31	Monday	Lab: Nutrition Group project start Group work – literature review and experimental plan	Lab assignment 2 – Zebrafish due 1/31 (9am)
	2/2	Wednesday	Construction of ponds; Physical, chemical, and biological characteristics of ponds	
Week 5	2/7	Monday	Lab: Tau Group project start Group work – Objectives & Hypothesis	Experimental plan – due 2/7 (9am)
	2/9	Wednesday	Physical criteria & Hatchery Settings	Lecture quiz 2 – due 2/11 (11pm)

Week 6	2/14	Monday	Lab: Polyploidy Group project start Group work – Annotated bibliography	Objectives and hypothesis – due 2/14 (9 am)
	2/16	Wednesday	Water quality criteria and species thermal limits	
Week 7	2/21	Monday	Lab: Polyploidy Group A project start	
	2/23	Wednesday	Reproduction and embryology	
Week 8	2/28	Monday	Recorded lectures Lab: Fish care & Group work – data analysis and figures/table assignment	Annotated bibliography – due 2/28 (9am) Lecture quiz 3 – due 3/4 (11pm)
	3/2	Wednesday	Guest Lecture	
Week 9	3/7	Monday	Lab: Tau group project run 2 Lab: Fish care & Group work – data analysis and figures/table assignment	Lab assignment 3 – Blood draw due 3/8 (11pm) Mini article preference Carmen assignment (due: 11:59pm)
	3/9	Wednesday	Midterm exam	Mini article assigned (3/9)
Week 10	3/14	Monday	Spring break (no classes)	
	3/16	Wednesday		
Week 11	3/21	Monday	Mini Article presentations	Figure/table assignment – due 3/21 (9am)
	3/23	Wednesday	Digestive tract physiology & Larval Fish Nutrition	
Week 12	3/28	Monday		
	3/30	Wednesday	Nutrient requirements (protein and amino acids)	Lecture quiz 4 – due 4/1 (11pm)
Week 13	4/4	Monday	Lab: Fish dissection	Lab assignment 4 – dissection Lab
	4/6	Wednesday	- Nutrient requirements (lipids)	

Week 14	4/11	Monday	Group Work	Lab assignment 4 – dissection Lab due 4/11 (9am)
	4/13	Wednesday	American Eel	
Week 15	4/18	Monday	Group Work	
	4/20	Wednesday	Sportfish culture	Lecture quiz 5 – due 4/22 (11pm) Final exam sign-up sheet will be distributed in class
Week 16	4/25	Monday	Lab: Research Project Presentations	Research Project presentations submitted to Carmen (due: 4/25 5pm)
	4/27	Wednesday	Research Project Manuscripts	Research Project Manuscripts submitted to Carmen (due: 4/27 11pm) Peer evaluations submitted to Carmen (due: 4/29 11pm)
Week 16/17	4/27- 5/3		Oral Final Exams	

***This is a proposed schedule for the course. Deadlines and scheduled lectures are subject to change as the instructor sees fit. Always refer to Carmen and in-class announcements for deadlines and due dates as any changes will not be reflected by this document.*