BIOL 4402 Ichthyology Spring 2024

Instructor and Course Information

Instructor:	Dr. Thornton Larson	**Office Hours:**	MW 9:00 AM – 11:00 AM
Office:	WSB 221		Tues: 4:00 PM – 6:30 PM
Office Phone:	(432)837-8084		By appt. virtual included
Email:	TRL21JZ@sulross.edu		
Lecture Rm:	WSB 107	**Lab Room:**	WSB 107
Lecture Time:	MW 12:30 PM – 1:45 PM	**Lab Time:**	W 2:00 PM – 3:40 PM

Course Description:

My name is Thornton Larson, and I love that I have the opportunity to teach you about the finniest animals in existence. It will be an exciting dive into the form and function of fishes, species with incredibly different internal anatomy and specialized diets. Whenever I teach any "ology" courses, I learn something new. I love ichthyology; I learn fascinating things every semester I teach it, and I love the diversity of species and the hobbies that go along with it, even in this desert! Interacting with you helps me connect this initial dive into Chondrichthyes and Osteichthyes with discoveries such as holes in the literature that could lead you, me, or us on a future research endeavor to uncover something new with fishes. This course will start with a greater classification of fishes and their basic structure and anatomy that connect all living fishes and even groups beyond. From there, we will learn all about the functions and physiological processes that allow ichthys to be so successful in their environments. Ichthys have radiated and diversified across different water and marine environments to be one of the most cosmopolitan animal groups in the world. We will look at the larger orders of fishes and follow their evolutionary history and distribution to the species we see today. Finally putting it all together to understand modern fish behavior, distribution, ecology, and conservation.

This course is designed to provide an overview of fishes and how to study them as a research interest or just awesome discoveries you can apply to other groups. Ichthyological research extends from laboratory staples such as zebra fish to big open oceans of sharks. Learning to use

the material available to you is key to understanding species. Understanding similarities and differences between closely related groups and those much more divergent will be invaluable to you as a researcher in the biological sciences.

This course is set up to be an online course that you can complete in 16 weeks. It will be subdivided into four (4) essential topics. Each topic covers between 4 and 6. Each unit will be paired with videos and exercises to help your understanding and test your knowledge. The textbook will be invaluable to you and your peers' ability to uncover material and apply it, so keep up with your reading, and it will lead you toward amazing ends.

Books and Materials

Required:

1. *The Diversity of Fishes: Biology, Evolution, and Ecology*, 3rd edition, Facey et al.

   This text is a large and comprehensive view of Ichthyology. We will overview every chapter in class but that is not a substitute for reading and studying the text on your own time. The larger part of lecture and lecture exams will be based on this text. This edition of the text is the most recent with the previous one coming out over 10 years ago so while the previous editions may have some of the material covered they will be lacking in more current information particularly in evolution, taxonomy, and methodologies.

Optional:

1. *Peterson Field Guide to Freshwater Fishes,* 2nd edition, Page and Burr. 2011

   While we will not get into the field as much as I would dream of for this course due to limited water space available. Having a guide to freshwater fish will prove useful for times in the field to identify various fish. We will be looking at game species as well as smaller species often not considered by a casual angler.

2. Freshwater Fishing license for the state of Texas (~$30)

   When we do go fishing if you wish to take part in the activity of catching fish you will need to have a proper license. Failure to have will result in whatever ticketing occurs from game wardens to the responsibility of the student. It is the responsibility of the student to be prepared with proper licensure for all activities.

Assessment:

Lecture:	
4 Lecture Exams (100 pts each)	400 pts
4 Paper Review Assignments (25 pts each)	100 pts
Exit Notes (Every Lecture)	50 pts
4 Self-Assessment of review papers	50 pts
Discussion Topic (Weekly replies)	50 pts
Discussion Topic (Weekly updates)	50 pts
Total Lecture Points:	**700 pts**

Lab:	
2 Lab Practicals	200 pts
Genus Presentation	100 pts
Lab Summaries (Summary after every lab)	100 pts
Total Lab Points:	**400 pts**

Total Course Points:	**1100 pts**

Total Credit

A 90 – 100% B 80 – 89% C 70 – 79% D 60 – 69% F < 60%

Attendance:

Mandatory. I will have a sign-in sheet at the front of the class, but this course is sized to where I will recognize when someone is not present. **I am allowed to drop you from my class** if you miss **more than six times** (that accounts for 3 full weeks of lectures). Even though permitted, I do not typically drop students from the course and will instead leave it as your responsibility, and you will be left with an 'F' for the course. I do not wish to hear excuses for missing class and I do not want to hear about it every time you are gone. Absences are excused only if you have a documented, university-approved excuse (hospitalization, funeral, etc.) **DO NOT MISS EXAMS** unless you have a documented, university-approved excuse. If you do not inform me of your approved absence before the exam, it will be a **ZERO**. For labs, **DO NOT MISS LAB PRACTICALS!!!** It is impossible to re-run them as they are set up with many lab components that take up space that is not guaranteed.

Summary Papers

More specific instructions on summary papers will be provided on Blackboard. The purpose of these assignments is for you to read current research in genetics. When I announce the assignments, you will have one week to submit the paper you plan to review to me, upon which I will state if A) it is a research paper (many students still at this stage in their education are unfamiliar with what constitutes a peer-reviewed research paper), B) if the paper is something that I think you are able to understand in a thorough enough manner to review it. If you choose

not to check the paper with me and it is not a peer-reviewed research paper, you will lose significant points on the assignment.

The review will then be submitted to Blackboard a week later and include a comparison paragraph to a **second** peer-reviewed paper. This second paper does not require a summary but just a comparison of ideas from the papers' discussion sections (the discussion section is the most important part of the paper). This paper will be 1.5 – 2 pages single-spaced, include citations in CSE format, and be written in a clear and concise manner expected of upper-level biology students. The paper is due by the beginning of class on the due date.

A special late policy will be in place for summary papers. The policy is as follows: if it is late 1 minute to 24 hours 10% will be taken off the assignment; from 24 to 48 hours 20% taken off; and from 48 to 72 hours 30% taken off. Anything after 72 hours (3 days) will be a zero. That is a daily grade level for papers that would receive 20/20 points.

Self-Assessment of Review Paper:

For this assignment students will receive a rubric similar to the one the instructor utilizes to assess the review paper assignment. Student will utilize their self-assessment to improve what they identify as weaknesses in their papers. Students will have one week to review followed by another week to turn in the final summary paper in accordance with all the rules seen in the above section.

Discussion Boards:

Each student will run a discussion topic chosen from a set at the beginning of the semester. The student will make an initial post regarding the subject and what they can discern at this stage of the semester.

Every week students will be expected to reply to at least one of the discussion board topics (never the same topic two weeks in a row). The reply will consist of information that the student may be familiar with or discuss how what the initial post helped them understand regarding a topic, or really anything as long as it is within the topic of the discussion board.

Students moderating that discussion board will reply to replies weekly and add more information on how their topic applies to lectures, readings (including their summary topics), or just learning interests. In this way, students interact with each other on various topics covered in detail throughout the semester. Also, this acts to increase familiarity with the topics among all students participating.

Exit Notes

Upon the conclusion of every class, students will fill out three notecards. One note card will express something they are totally lost on and should consider scheduling office hours to discuss for their understanding. The second is for things they mostly got. This will inform the instructor to consider reviewing that specific topic, likely at the beginning of the next class. The third is for topics that they completely understand. All of these allow the instructor to understand what areas may need more attention given to them in next lectures, reviews before exams, and even future courses.

Course Objectives:

At the end of the semester, students will…

1. Identify and describe the major taxonomic groups of fishes
2. Describe and Understand the morphological features and physiological processes of fishes, including respiration, osmoregulation, and locomotion
3. Evaluate the factors that have contributed to the modern biodiversity of fishes
4. Analyze the ecological roles of fishes in marine and freshwater ecosystems
5. Interpret behavioral adaptations of fishes in response to their environments
6. Assess human impacts on fish populations and habitats and develop conservation strategies for sustainable management of fish resources
7. Review ichthyological literature and communicate peer-reviewed findings effectively
8. Propose solutions to real-world problems affecting fish populations utilizing scientific evidence

Student Learning Outcomes (SLOs) for Biology:

1. Demonstrate an understanding of evolution by natural selection.
2. Demonstrate an integration of environmental awareness into everyday modern life.
3. Understanding how to incorporate molecular biology into the study of the whole organism.
4. Demonstrate utilization of various field techniques toward addressing scientific questions in the discipline.
5. Conduct basic laboratory experiments utilizing standard observational strategies.

Marketable Skills:

1. Ability to organize, analyze, and interpret data.
2. Proficiency in using presentation software.
3. Experience in managing time and meeting deadlines.
4. Ability to speak effectively and write concisely about scientific topics.
5. Experience in the development of professional email correspondence.

SRSU Library Services:

The Sul Ross Library offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu. Off-campus access requires your LoboID and password. Check out materials using your photo ID. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (432-837-8123).

No matter where you are based, public libraries and many academic and special libraries welcome the general public into their spaces for study. SRSU TexShare Cardholders can access additional services and resources at various libraries across Texas. Learn more about the TexShare program by visiting library.sulross.edu/texshare or ask a librarian by emailing srsulibrary@sulross.edu.

SRSU Accessibility Services:

SRSU Accessibility Services. Sul Ross State University (SRSU) is committed to equal access in compliance with the Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Students seeking accessibility/accommodations services must contact Mrs. Mary Schwartze Grisham, LPC, SRSU's Accessibility Services Director at 432-837-8203 or email mschwartze@sulross.edu. Our office is located on the first floor of Ferguson Hall, room 112, and our mailing address is P.O. Box C122, Sul Ross State University, Alpine. Texas, 79832.

Counseling:

Sul Ross has partnered with TimelyCare where all SR students will have access to nine free counseling sessions. You can learn more about this 24/7/356 support by visiting Timelycare/SRSU. The SR Counseling and Accessibility Services office will continue to offer in-person counseling in Ferguson Hall room 112 (Alpine campus), and telehealth Zoom sessions for remote students and RGC students.

Academic Honesty and Integrity:

Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. Students should submit work that is their own and avoid the temptation to engage in behaviors that violate academic integrity, such as turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden. Students should also avoid using open AI sources unless permission is expressly given for an assignment or course. Violations of academic integrity can result in failing assignments, failing a class, and/or more serious university consequences. These behaviors also erode the value of college degrees and higher education overall.

Classroom Climate of Respect:

Importantly, this class will foster free expression, critical investigation, and the open discussion of ideas. This means that all of us must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, we must all learn how to probe, oppose and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Still, we will not be silenced by the difficulty of fruitfully discussing politically sensitive issues.

Supportive Statement:

I am to create a learning environment for my students that supports various perspectives and experiences. I understand that the recent pandemic, economic disparity, and health concerns, or even unexpected life events may impact the conditions necessary for you to succeed. My commitment is to be there for you and help you meet the learning objectives of this course. I do this to demonstrate my commitment to you and to the mission of Sul Ross State University to create a supportive environment and care for the whole student as part of the Sul Ross Familia. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you.

Tentative Lecture Schedule

If links in optional material do not open, check the link address and use that. Also, the title should be mostly the same as the video I linked to, so hypothetically, if you type in the title on YouTube, it may come up.

Date	Subject title	Chapter	Assignment	Optional Material
1/17	Introduction to Course and The Science of Ichthyology	Syllabus and Chapter 1	Discussion Post Chosen First Post before Monday Class	What is Ichthyology
1/22	Phylogenetic Procedures	Chapter 2	- Discussion Posts for Week assigned - First Review Paper assigned	Clint Explains Phylogenetics - There are a million wrong ways to read a phylogenetic tree
1/24	Structure and Function of the Head	Chapter 3	- Summary Paper check	Gas Exchange in Fish
1/29	Structure and Function of Trunk and Fins	Chapter 4	- Discussion Posts for the Week assigned - First Review Paper draft due - begin self-assessment 1	How to Count Fin Rays and Spines in Sunfishes
1/31	**Exam 1**	**Ch 1 – 4**		

2/5	Circulation, Gas Transport, Metabolism, Digestion, and Energetics	Chapter 5	- Discussion Posts for the Week assigned - self-assessment 1 Due - Review Paper 1 assigned	
2/7	Nervous System and Sensory Organs	Chapter 6		A Shark's Entire Body Is an Ear
2/12	Homeostasis	Chapter 7	- Discussion Posts for the Week assigned - Review Paper 1 due - Review Paper 2 assigned	What is Homeostasis in fish?
2/14	Reproduction	Chapter 8	- Summary Paper Check	FISH LIFE CYCLE
2/19	Larvae, Juveniles, Adults, Age, and Growth	Chapter 9	- Discussion Posts for the Week assigned - Summary Paper 2 draft due -begin self-assessment 2	
2/21	Special Habitats and Special Adaptations	Chapter 10		Meet the bluefin tuna
2/26	Review Unit 2	Ch 5 – 10	- Discussion Posts for the Week assigned - self-assessment 2 Due - Review Paper 2 assigned	
2/28	**Exam II**	**Ch 5 – 10**		
3/4	A History of Fishes	Chapter 11	- Discussion Posts for the Week assigned	When Animals Learnt to Bite
3/6	Chondrichthyes: Sharks, Skates, Rays, and Chimaeras	Chapter 12	- Review Paper 2 due - Review Paper 3 assigned	
3/11	Spring Break			
3/13				
3/18	Living Representatives of Primitive Fishes	Chapter 13	- Discussion Posts for the Week assigned - Summary Paper check	5 Prehistoric Fish Still Alive Today
3/20	Teleosts I: Elopomorpha Through Paaracanthopterygii	Chapter 14		Lecture 48 The Modern Fish: Neopterygii and the Arrival of the Teleostei
3/25	Teleosts II: Spiny-Rayed Fishes	Chapter 15	- Discussion Posts for the Week assigned - Summary Paper 3 draft due -begin self-assessment 3	Lecture 48 The Modern Fish: Neopterygii and the Arrival of the Teleostei
3/27	Review Unit 3	Ch 11 – 15		
4/1	**Exam III**	**Ch 11 – 15**	**- Discussion Posts for the Week assigned**	

			- self-assessment 3 Due **- Review Paper 3 assigned**	
4/3	Fish as Predators and Prey	Chapter 16		Deadly Predators of the Reef
4/8	Fishes as Social Animals	Chapter 17	- Discussion Posts for the Week assigned - Review Paper 3 due - Review Paper 4 assigned	Amazing Fish Form Giant Ball to Scare Predators
4/10	Cycles of Activity and Behavior	Chapter 18	- Summary Paper check	Fish Migration: Everything You Ever Wanted to Know
4/15	Zoogeography and Phylogeography	Chapter 19	- Discussion Posts for the Week assigned - Summary Paper 4 draft due -begin self-assessment 4	The Biogeography of the Oceans
4/17	Fish Populations	Chapter 20		Stock Assessment Fundamentals
4/22	The Functional Role of Fishes in Communities and Ecosystems	Chapter 21	- Discussion Posts for the Week assigned - self-assessment 4 Due - Review Paper 4 assigned	
4/24	Conservation of Fishes	Chapter 22		- Will the ocean ever run out of fish? - How to Establish and Manage Fish Conservation Zones
4/29	Review Unit 4	Ch 16 – 22	Review Paper 4 Due	
5/3	**Exam IV (FINAL EXAM)**	**Ch 16 – 22**	**Exam at 12:30 to 2:30**	

Tentative Lab Schedule

Date	Lab	Assignment	Optional/Extra Credit
1/17	No Lab		
1/24	Lab Intro and Scientific Nomenclature	Summary Worksheet	
1/31	Lamprey Dissection	Summary Worksheet	
2/7	Shark Dissection	Summary Worksheet	
2/14	Marine Fish Taxonomy	Summary Worksheet	
2/21	Homeostasis Experiment	Summary Worksheet	
2/28	Freshwater Taxonomy 1 and Phylogenetic Trees	Summary Worksheet	
3/6	Lab Practical 1		
3/13	SPRING BREAK		
3/20	Perch Dissection	Summary Worksheet	Saturday Trip to Lake Balmorhea
3/27	Freshwater Taxonomy 2 and Field Techniques	Summary Worksheet	
4/3	Freshwater Taxonomy 3	Summary Worksheet	Weekend Camping Fishing trip to Independence Creek (subject to change)
4/10	Freshwater Taxonomy 4 and 5	Summary Worksheet	
4/17	Presentation		
4/24	Lab Practical 2		