

Biology of Fishes (WA Biology 4212): Course Syllabus 2023

INSTRUCTOR:	Haley MacLeod, PhD(c) Office: FB 1018 email: hmacleo1@lakeheadu.ca Office hours: By appointment (send me an email and we can find a time to chat!)																
LAB INSTRUCTOR:	Dan Brazeau Office: CB 3020 Email: dbrazeau@lakeheadu.ca Office hours: By appointment																
TEACHING ASSISTANT:	Cody Veneruzzo, PhD(c) Office: FB 1018 Email: cwveneru@lakeheadu.ca Office hours: By appointment																
LECTURES:	Mon & Wed - 5:30 – 7:00 PM Room: AT 2004																
LAB:	Wed 8:30 – 11:30 AM Room: CB 3015																
EVALUATION:	<table><tr><td>Lecture Midterm</td><td>= 15%</td></tr><tr><td>Lecture Final</td><td>= 20%</td></tr><tr><td>Lab Exam</td><td>= 13%</td></tr><tr><td>Pre-lab Assignments</td><td>= 7%</td></tr><tr><td>Dissection Report</td><td>= 10%</td></tr><tr><td>Final Lab Report</td><td>= 20%</td></tr><tr><td>Aquatic Ecology Paper Discussion</td><td>= 5%</td></tr><tr><td>Science Communication Assignment</td><td>= 10%</td></tr></table>	Lecture Midterm	= 15%	Lecture Final	= 20%	Lab Exam	= 13%	Pre-lab Assignments	= 7%	Dissection Report	= 10%	Final Lab Report	= 20%	Aquatic Ecology Paper Discussion	= 5%	Science Communication Assignment	= 10%
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Last date for withdrawal without academic penalty: Friday, 10 March 2023

COURSE OBJECTIVES

Required Textbook: A Field Guide to Freshwater Fishes of Ontario (Available at the Lakehead Bookstore)

Optional Textbook: Essential Fish Biology: Diversity, structure, and function. 2017. Burton, D. & Burton, M. (This textbook can be found online if textbooks are helpful to your learning style, but this textbook is not required for this course)

Lab Manual: Modules provided in the Lab Content Tab of D2L. *The field guide is required for the Fish identification component of labs and available through the Lakehead Bookstore.*

Lectures

Fishes represent the largest and most diverse group of vertebrates. This upper-level course will provide an overview of the diversity and biology of fishes. Lecture material will cover the systematics, evolution, anatomy, biology, and ecology of fishes. Additional topics will include fish behaviour, fisheries techniques, including various aspects of stock assessment and conservation.

Labs in the first half of the course will examine the morphology, classification, and identification of fishes. In the lab you will examine live and preserved specimens and will be expected to recognize specific structures and understand the function(s) they serve, how they may differ among groups, and how those structures may serve to define taxonomic groups. At the conclusion of the course, you should be able to recognize species of the major fish taxa in Northwestern Ontario, understand how they survive and persist in their environment and, (hopefully) have an appreciation of the great array of fish diversity.

The second half of the course will focus on developing critical thinking skills and confidence in the use of the scientific method through data collection and analyses, as well as scientific writing with an emphasis on fisheries management. Including the exploration, analysis and interpretation of growth, mortality, and production rates from fisheries data, and method in population estimation and stock-recruitment models.

Course Policies

Exams

Missed exams will receive a grade of zero unless you are absent for a documented valid reason such as a family or medical emergency. If you wish to have an exam regraded you must submit a written explanation of why you think the assigned grade was incorrect within 2 weeks of return of the exam. Be aware the entire exam will be re-evaluated and your mark may go up, remain the same, or go down. **NOTE:** this does not apply to arithmetic errors such as incorrect addition. You may bring these types of errors to my attention for correction, without a written explanation, at any time.

Written Assignments

Late Penalty: Written assignments submitted late will be **penalised 10% per day** except for a documented valid reason such as a family or medical emergency.

Plagiarism: Papers will not be graded in the absence of a completed and signed form indicating the understanding of plagiarism in its many forms. **This will require the completion of an assignment relating to plagiarism.** Additional direction regarding topics and format will be provided in class.

Assignment Extensions: Please never hesitate to reach out for an extension on assignments. Extensions on assignments can be a great time management tool. However, requesting extensions hours before the deadline or after work hours before the assignment is due will not be permitted. Last minute extension requests will not be accommodated.

Pre-Lab Assignments: Are to be completed prior to each lab (as specified by your TA), they will be handed in and marked at the beginning of each lab. Each pre-lab assignment is worth 1%, there will be a total of 7 pre-lab assignments for a total of 7% of your mark. Accommodations will be made for students that need to miss lab periods (for legitimate reasons).

Academic Dishonesty

(The following is taken directly from the University website, with minor modification)

The University takes a most serious view of offences against academic honesty. Penalties for dealing with such offences will be strictly enforced.

The following rules shall govern the treatment of candidates who have been found guilty of attempting to obtain academic credit dishonestly.

(a) ***The minimum penalty*** for a candidate found guilty of plagiarism, or of cheating on any part of a course will be a zero for the work concerned.

(b) A candidate found guilty of cheating on a formal examination or a test, or of serious or repeated plagiarism, or of unofficially obtaining a copy of an examination paper before the examination is scheduled to be written, ***will receive zero for the course and may be expelled from the University.***

A copy of the "Code of Student Behaviour and Disciplinary Procedures" may be obtained from the Office of the Registrar.

Proposed Class Schedule (subject to change)

Lecture or Lab	Date	Topic	Recommended Readings
Lecture 1	Jan 9	Introductory Lecture – Class Overview & Expectations; & What is a fish/basic anatomy and phylogeny	Burton Chapter 1, Appendix 15.1, Chapter 13
Lab	Jan 11	NO LAB	
Lecture 2	Jan 11	Phylogeny continued; Hagfish and lampreys, Evolution of jaws, Elasmobranchs; Teleosts, Coelacanth, Dipnoi; Lungfish, Actinopterygii: sturgeons, paddlefish	Burton Chapter 1
Lecture 3	Jan 16	Teleostei, phylogenetic trends: Osteoglossomorpha, Elopomorpha, Otocephalomorpha, Euteleostei	Burton Chapter 1
Lab	Jan 18	Fish Dissection Lab 1: Herring	

Lecture or Lab	Date	Topic	Recommended Readings
Lecture 4	Jan 18	Anatomy: Skeletal, appendicular, scales, musculature, gas bladder Locomotion: aquatic habitat, drag, thrust, propulsion, fin aspect ratio, control, schooling	Burton Chapter 2, 3
Lecture 5	Jan 23	Feeding: jaws, pharyngeal jaws, dentition, mouth position, digestion	Burton Chapter 4
Lab 1	Jan 25	Fish Dissection Lab 2: Lamprey & Dog fish	
Lecture 6	Jan 25	Circulatory Transport and Gas Exchange; Respiration: Gill Structure, Gill Function, Ventilation, Air Breathing	Burton Ch. 5, 6
Lecture 7	Jan 30	Metabolism & Homeostasis; Excretion & Osmoregulation	Burton Ch. 7, 8
Assignment Due	Jan 31	Dissection Lab Assignment	
Lab 2	Feb 1	Fish ID Lab 1	
Lecture 8	Feb 1	Metabolism and Excretion cont.	Burton Ch. 7, 8
Lecture 9	Feb 6	Reproduction	Burton Ch. 9
Lab 3	Feb 8	Fish ID Lab 2	
Lecture 10	Feb 8	Hormones & The Nervous System	Burton Ch. 10, 11
MIDTERM	Feb 13	MIDTERM EXAM	
Lab 4	Feb 15	Journal Article Discussion Lab	
Lecture 11	Feb 15	Perception & Sensation: Photoreception, Mechanoreception, (Sound, Lateral Line), Equilibrium & Balance, Chemoreception (Smell, Taste), Electroreception, Magnetic Reception.	Burton Ch. 12
<i>Reading break</i>	<i>Feb 20-24</i>	<i>Lab open to study specimens for lab exam</i>	
Lecture 12	Feb 27	Fisheries Management Overview	
Lab 5	Mar 1	Lab Exam	
Lecture 13	Mar 1	Age and growth (start abundance if we can)	Burton Ch. 16
Lecture 14	Mar 6	Estimating abundance and production	
Lab 6	Mar 8	Lab Report Part 1: Abundance and Production	
Lecture 14	Mar 8	Mortality & Survival	
Lecture 15	Mar 13	Guest Lecture: Dr. Rob Mackareth CNFER	
Lab 7	Mar 15	Lab Report Part 2: Mortality	
Lecture 16	Mar 15	Guest Lecture: Dr. Gretchen Lescord WCS	

Lecture or Lab	Date	Topic	Recommended Readings
Lecture 17	Mar 20	Effort, MSY & Sustainable Yield	
Lab 8	Mar 22	Open Lab Period - Lab Report Help	
Lecture 18	Mar 22	Stock-Recruitment	Burton Chapter 9, Section 14.8, 13.12...
Lecture 19	Mar 27	Mating & Behaviour	
Assignment Due	Mar 28	Lab Report Due	
Lab 9	Mar 29	Field Trip to Dorian Fish Hatchery	
Lecture 20	Mar 29	Locomotion & Migration	
Lecture 21	Apr 3	Feeding Ecology & Diet	
Assignment Due	Apr 5	Science Communication Assignment Due	
Lecture 22	Apr 5	Physiology and Energetics in Fisheries Research	
Final exam	TBD		