

Biology 4212 Biology of Fishes
Course syllabus
Winter term 2021

- TEXTS:**
1. Essential Fish Biology: Diversity, structure and function. Derek & Margaret Burton. Oxford University Press. ISBN: 978-0-19-878556-9
 2. ROM Keys to The Identification of Ontario Freshwater Fishes. Erling Holm. Royal Ontario Museum.

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

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LECTURES: Tues & Thurs – 9:00 – 10:30 pm – Online via Zoom (links on D2L site)

LAB: Mon 11:30-2:30 – Online via Zoom (links on course D2L site)

EVALUATION:

Lecture Midterm	= 20%
Lecture Final	= 25%
Participation Marks	= 5%
Student Fish ID presentations	= 5%
Dissection report	= 10%
Fish ID quiz	= 10%
Data entry assignment	= 5%
Written Assignment	= 10%
Fisheries management (Excel Assignment)	= 10%

Last date for withdrawal without academic penalty: Friday 19 March 2021

COURSE OBJECTIVES:

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 data collection and scientific writing with an emphasis on fisheries management, including the exploration, analysis and interpretation of growth rates from fisheries data, methods in population estimation and stock recruitment models. Rather than conducting experiments and reports on live fish, given the limitations of the COVID-19 pandemic, we will utilize both specimens and information for fishes that are readily available at local supermarkets.

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

Written assignments submitted late will be penalized 10% per day except for a documented valid reason such as a family or medical emergency. 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 online exercise and quiz relating to plagiarism.** Additional direction regarding topics and format will be provided in class.

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 Schedule (subject to change):

Lecture or Lab	Date	Topic	Recommended readings
Lab	Jan 11	Introductory Lab and Dissection Demo	
Lecture 1	Jan 12	What is a fish/basic anatomy and phylogeny	Burton Chapter 1, Appendix 15.1, Chapter 13
Lecture 2	Jan 14	Phylogeny continued; Hagfish and lampreys, Evolution of jaws, Elasmobranchs; Teleosts, Coelacanth, Dipnoi: lungfish, Actinopterygii: sturgeons, paddlefish	Burton Chapter 1
Lab	Jan 18	Fish Dissection Lab	
Lecture 3	Jan 19	Teleostei, phylogenetic trends: Osteoglossomorpha, Elopomorpha, Otocephalomorpha, Euteleostei	Burton Chapter 1
Lecture 4	Jan 21	Anatomy: Skeletal, appendicular, scales, musculature, gas bladder Locomotion: aquatic habitat, drag, thrust, propulsion, fin aspect ratio, control, schooling	Burton Chapter 2, 3
Lab	Jan 25	Fish ID Part 1: Using a key	
Lecture 5	Jan 26	Feeding: jaws, pharyngeal jaws, dentition, mouth position, digestion	Burton Chapter 4
Lecture 6	Jan 28	Circulatory transport and gas exchange; Respiration: gill structure, gill function, ventilation, air breathing	Burton Ch. 5, 6
Lab	Feb 1	Fish ID Part 2: Student presentations	

Lecture or Lab	Date	Topic	Recommended readings
Lecture 7	Feb 2	Metabolism and homeostasis; excretion and osmoregulation	Burton Ch. 7, 8
Lecture 8	Feb 4	Metabolism and excretion continued	Burton Ch. 7, 8
Lab	Feb 8	Fish ID Part 3: Student presentations	
Lecture 9	Feb 9	Reproduction	Burton Ch. 9
Lecture 10	Feb 11	Hormones and the nervous system	Burton Ch. 10, 11
<i>Reading break</i>	<i>Feb 15-25</i>		
Lab	Mar 1	Fish ID Quiz on D2L (must be completed during lab period)	
Lecture 11	Mar 2	Perception and sensation: photoreception, mechanoreception, (sound, lateral line), equilibrium and balance, chemoreception (smell, taste), electroreception, magnetic reception	Burton Ch. 12
MIDTERM	Mar 4	Midterm exam	
Lab	Mar 8	Supermarket lab	
Lecture 12	Mar 9	Fisheries management overview	
Lecture 13	Mar 11	Mating, behaviour	Burton Chapter 9, Section 14.8, 13.12
Lab	Mar 15	Data analysis, Excel 101 (computer lab)	
Lecture 14	Mar 16	Locomotion, migration	Burton Ch. 14
Lecture 15	Mar 18	Guest lecture; Management of mercury in fishes (Dr. Rob Mackereth, OMNRF)	
Lab	Mar 22	Writing workshop	
Lecture 16	Mar 23	Age and growth	Burton Ch. 16
Lecture 17	Mar 25	Estimating abundance	
Lab	Mar 29	Ageing lab (MNRF, Paul Drombolis)	
Lecture 18	Mar 30	Mortality and survival	
Lecture 19	Apr 1	Feeding ecology, diet	
	Apr 5	NO LAB- Easter Monday	
Lecture 20	Apr 6	Physiology and energetics in fisheries research	
Lecture 21	Apr 8	Stock-recruitment	
Lab	Apr 12	Lab- fisheries analysis (computer-based)	
Lecture or Lab	Date	Topic	Recommended readings
Lecture 22	Apr 13	Effort, MSY and sustainable yield	

Lecture 23	Apr 15	NO CLASS	
Final exam	Apr 24	Available noon Saturday April 24th; Due Sunday April 25th at noon	