

## Syllabus

<b>Course:</b>	BIO 362 Biology & Diversity of Fishes (4 credits)
<b>Semester:</b>	Fall 2021
<b>Format:</b>	Traditional instruction method (face-to-face)
<b>Lecture:</b>	11:30 AM – 12:45 PM, Tuesday & Thursday, 2225 Kindschi Hall of Science (KHS)
<b>Lab:</b>	2:00 – 4:50 PM, Thursday, 1170 KHS
<b>Instructor:</b>	Dr. Carl Ruetz, Annis Water Resources Institute (AWRI)
<b>Office/ Telephone:</b>	<i>Muskegon:</i> 136 Lake Michigan Center/616-331-3946 <sup>1</sup> <i>Allendale:</i> 3394 KHS/616-331-9357
<b>E-mail:</b>	<a href="mailto:ruetzc@gvsu.edu">ruetzc@gvsu.edu</a> I will respond to e-mails within 24 hours during weekdays (usually faster); I check e-mail intermittently on the weekend but may not respond until Monday morning
<b>Website:</b>	<a href="http://www.gvsu.edu/wri/ruetz/">http://www.gvsu.edu/wri/ruetz/</a>
<b>Office Hours:</b>	Virtual by appointment Available 9:00-10:00 AM, Tuesday (3394 KHS; e-mail to schedule); or weekdays by appointment (depending on my availability)
<b>Self-Assessment:</b>	Students coming to campus are required to complete online the COVID-19 Self-Assessment ( <a href="https://www.gvsu.edu/hro/selfassessment-login.htm">https://www.gvsu.edu/hro/selfassessment-login.htm</a> ). If you do <u>not</u> receive the “green heart” after completing your self-assessment (meaning that you passed), then you will find next steps below your result on their self-assessment. You should stay at home (i.e., do NOT come to campus or class) and follow the steps to get tested if you get the red “Not Passed.” <u>Students may be asked periodically in class to show the “green heart” on their smart phone to confirm they have completed and passed the self-assessment.</u>

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<sup>1</sup>Please call my Muskegon telephone number to leave messages.

## BIO 362 Fisheries Biology

- Technology:**
- The online instruction environment will be in Blackboard; announcements, assignments, schedule changes and grades will be posted online; some assessments (e.g., quizzes) and discussion will be done online; online access will be used to enhance class and coursework
  - You will need to be able to open PDF files
  - Documents should be submitted as PDF files
  - Information on self-directed Blackboard Orientation with links to additional help documents is available from the “Online Education” website (<https://www.gvsu.edu/online/are-you-ready-for-online-learning-5.htm>).
  - For technology-related questions, please contact GVSU’s Information Technology (<https://www.gvsu.edu/it>) at [it@gvsu.edu](mailto:it@gvsu.edu) or 616-331-2101
  - Please contact me if you have any questions or concerns

- Texts:**
- Hubbs, C.L., K.F. Lagler, and G.R. Smith. 2004. Fishes of the Great Lakes region, Revised edition. The University of Michigan Press. [Required]
- Helfman, G.S., B.B. Collette, D.E. Facey, and B.W. Bowen. 2009. The diversity of fishes: biology, evolution, and ecology, 2<sup>nd</sup> edition. Wiley-Blackwell. [Recommended]

**Prerequisite:** BIO 215 Ecology

**Description:** Study of the anatomy, morphology, and classification of fishes and their biology, ecology, and evolution. Emphasis on species native to the Great Lakes region.

**Objectives:** After the successful completion of this course, student will be able to:

1. Outline the major groups of fishes and their evolutionary relationships.
2. Compare the morphology, physiology, and biology of fish.
3. Identify Michigan fishes to the level of family, genus, and species.
4. Demonstrate proficiency in fish sampling techniques
5. Summarize and critically evaluate scientific papers and concepts related to the ecology and evolution of fishes.

## BIO 362 Fisheries Biology

### Lecture Schedule:

This schedule may be modified by the instructor during the semester.

Week	Date	Learning Module
1	8/31 & 9/2	<i>Topic: Introduction; General Morphology</i>
2	9/7 & 9/9	<i>Topic: Classification and Systematics</i> <i>Virtual Discussion</i> <b>Labor Day recess (9/5-6)</b>
3	9/14 & 9/16	<i>Topic: Diversity of fishes (major groups); History of Ichthyology</i> <i>Virtual Discussion</i>
4	9/21 & 9/23	<i>Topic: Osmoregulation, Circulation, Respiration, and Endothermy</i> <i>Virtual Discussion</i>
5	9/28 & <b>9/30</b>	<i>Topic: Gas bladder, Buoyancy, and Locomotion</i> <b>Lecture Quiz 1 (9/30)</b>
6	10/5 & 10/7	<i>Topic: Auditory, Mechanosensory, and Electrosensory Systems</i> <i>Virtual Discussion</i>
7	<b>10/12</b> & 10/14	<i>Topic: Life History Terminology and Strategies; Fish Reproduction</i> <b>Midterm Exam (10/12)</b>
8	10/19 & 10/21	<i>Topic: Jawless Fishes</i>
9	10/28	<i>Topic: Gnathostome Evolution and Chondrichthyes</i> <b>Fall Break (no class on 10/26)</b>
10	11/2 & 11/4	<i>Topic: Sarcopterygii</i> <i>Virtual Discussion</i>
11	11/9 & 11/11	<i>Topic: Actinopterygii</i> <i>Virtual Discussion</i>
12	<b>11/16</b> & 11/18	<i>Topic: Actinopterygii</i> <b>Lecture Quiz 2 (11/16)</b>
13	11/23	<i>Topic: Actinopterygii</i> <b>Thanksgiving break (no class on 11/25)</b>
14	11/30 & 12/2	<i>Topic: Actinopterygii</i> <i>Virtual Discussion</i>
15	12/7 & 12/9	<i>Topic: Actinopterygii</i>
16	12/14	<b>Final exam (10-11:50 am)</b>

*Note:* The lecture quizzes and exams will all be face-to-face and closed book/notes.

### Laboratory Schedule:

This schedule may be modified by the instructor during the semester.

Week	Date	Learning Module
1	9/2	<i>Fish identification:</i> Petromyzontidae (2), Polyodontidae (1), Acipenseridae (1), Lepisosteidae (2), Amiidae (1) <b>Virtual Fish Identification Quiz</b>
2	9/9	<i>Fish identification:</i> Catostomidae (4+3), Anguillidae (1), Clupeidae (2)
3	9/16	<i>Fish identification:</i> Ictaluridae (6+1), Esocidae (3), Umbridae (1), Osmeridae (1) <b>Virtual Fish Identification Quiz</b>
4	9/23	<i>Fish identification:</i> Salmonidae (10+2)
5	9/30	<i>Fish identification:</i> Percopsidae (1), Apredoderidae (1), Gadidae (1), Fundulidae (1), Antherinopsidae (1), Gasterosteidae (2+1) <b>FF Fish Identification Quiz</b>
6	10/7	<i>Fieldtrip</i> – backpack electrofishing Sand Creek
7	10/14	<i>Fieldtrip</i> – trawling on Spring Lake <b>Virtual Fish Identification Quiz</b>
8	10/21	<i>Fieldtrip</i> – fyke netting
9	10/28	<i>Fish identification:</i> Cyprinidae (18) <i>FF Paper Discussion</i>
10	11/4	<i>Fish identification:</i> Cottidae (3), Monronidae (2), Centrarchidae (8+2) <b>FF Fish Identification Quiz</b>
11	11/11	<i>Fish identification:</i> Percidae (5+4), Sciaenidae (1), Gobiidae (2) <b>Virtual Fish Identification Quiz</b>
12	11/18	<i>Topic:</i> Review for <i>Fish Identification Exam</i> and finalize <i>Fish Identification Notebook</i> <b>FF Fish Identification Quiz*</b> <i>FF Paper Discussion</i>
13	11/25	<b>Thanksgiving break (no class)</b>
14	12/2	<b>Fish Identification Exam</b>
15	12/9	<i>Topic:</i> Review for lecture final exam <b>Fish Identification Notebooks due</b> <i>FF Paper Discussion</i>

\* All fish identification quizzes will be worth 5 points each except for the quiz on 11/18, which will be worth 10 points.

*Note:* FF = face-to-face. The estimated number of species students will learn to identify is listed for each family parenthetically. The notation is the number of species with preserved specimens + number of species without preserved specimens. The actual number of species covered in the laboratory may deviate from these estimates.

**Grading & Evaluation:** Grades will be calculated as a percentage of the total points possible (e.g., 93-100% = A, 90-92.9% = A-, 88-89.9% = B+, 82-87.9% = B, 80-81.9% = B-, etc). As a general policy, grades on all work are considered final (i.e., they will NOT be changed) 2 weeks after the work is returned to the student. The actual number of points in the course may differ from the table below if assessments are adjusted (e.g., added, dropped, or modified) by the instructor.

Lecture		Lab	
Lecture Quizzes (25 points each)	50	Participation in Sampling Fieldtrips	15
Midterm Exam (comprehensive)	50	Participation in FF Paper Discussion	15
Final Exam (comprehensive)	100	Paper Discussion Questions	15
Virtual Discussion (10 points each)	70	FF Fish Identification Quizzes	20
Essay Topic	5	Virtual Fish Identification Quizzes	20
Essay	25	Fish Identification Exam	100
		Fish Identification Notebook	25
<b>Total</b>	<b>300</b>	<b>Total</b>	<b>210</b>

**CLASS TOTAL: 510**

*Virtual Discussion*—This course will actively engage students in online discussion as a critical component of each learning module, providing students an opportunity for active reflection, critical analysis, and sharing. Students are expected to demonstrate a professional attitude, time management skills, and mastery of scientific concepts and knowledge. Online student participation is critical for optimum learning. “Flaming” or other derogatory/inappropriate comments, messages, or discussion posts are unprofessional and unacceptable. Please be kind to your fellow students and instructor.

*Essay*—Students are required to write a brief (maximum text 3 pages excluding references) on the ecology, evolution, or physiology of a species or group of fishes. The essay should be based on at least 3 references from the primary literature (i.e., peer-reviewed journal articles) but can include other factual references.

The essay should be typed, double spaced, and have 1-inch margins. References should follow the EXACT format used by *Transactions of the American Fisheries Society*.

The *topic* of your essay should include a title, a brief description of your topic (3 sentences or less), and at least one reference. A rubric will be posted with the assignment for both the *Essay Topic* and *Essay*.

*Participation in Sampling Fieldtrips*—Students are expected to attend all fieldtrips. Participation will be evaluated based on your involvement with sampling and identifying fishes.

*Fish Identification and Fish Identification Notebook*—The main emphasis in laboratory is for students to become proficient at identifying Great Lakes fishes. A list of species that students will learn to identify will be provided for each learning module. Virtual Fish Identification Quizzes will be open book and open note; however, these quizzes will be timed and students will not have to ability to “go back” once they have submitted an answer (i.e., identified a picture).

FF Fish Identification Quizzes and the Fish Identification Exam will focus on preserved specimens.

The Fish Identification Notebook should include the following for each fish species: family name, common name (generally accepted by scientists), and scientific name; picture(s) or drawing(s) of the species; a list of key characteristics for identification; and whether the species was captured on a fieldtrip (if so, then where?). Additionally, the notebook should have a table of contents. For the face-to-face evaluations focusing on fish identification, students will ONLY be allowed to use their Fish Identification Notebook as a resource. Students are required to purchase a 100-sheet, bound composition notebook.

*Participation in FF Paper Discussions & Discussion Questions*—Students will be expected to participate in three paper discussions in the laboratory. Participation will be evaluated based on the quantity/quality of comments. Reading assigned papers prior to discussion is required, and attendance at paper discussions is mandatory.

In preparation for discussions, students will be given a set of questions to answer regarding a discussion paper to facilitate critical thinking. Answers must be typed and turned in electronically the day of the discussion. Good writing will be rewarded, and late assignments will NOT be accepted. Discussion questions will be posted on blackboard. These should be completed regardless of whether you are able to attend the face-to-face discussion.

*Extra Credit*—Exams and quizzes will periodically have extra credit questions. Additionally, each student may earn 5 points of extra credit by sharing with the class a recent news report or journal publication that has relevance to the course. The “headline” should relate to fish in some way. Students will have an opportunity to share a “headline” at the beginning of each lecture. Each student can share one “headline” per lecture (each “headline” is worth 1 point). If more than one student reports on the same “headline,” then extra credit will only be awarded to the first student to report on the “headline.” Students are expected to provide documentation of their “headline” (e.g., copy of article or web link). The instructor will determine the relevance of each “headline” and whether extra credit is awarded.

**Attendance:** Students should contact the instructor prior to missing a fieldtrip, paper discussion, quiz, or exam. Absences will be excused for illness or other unavoidable instances; students may be asked to provide documentation for an absence to be excused.

**Safety:** Students are required to wear face coverings that cover their mouth and nose when we meet for all indoor, face-to-face activities based on GVSU’s face covering policy (<https://www.gvsu.edu/lakerstogether/face-covering-policy-27.htm>). Face coverings also will be required in university vehicles for fieldtrips. If you are unable to wear a face covering due to a medical condition, then please contact Disability Support Resources (see below).

**Special Needs:** If a student needs an accommodation due to a learning, physical, or other disability, then the student must present a memo to the instructor from Disability Support Resources (DSR), indicating the existence of a disability and the suggested reasonable accommodation. If you have not already done so, please contact the DSR office

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(<https://www.gvsu.edu/dsr/>) by calling 616-331-2490 or email to [dsrgvsu@gvsu.edu](mailto:dsrgvsu@gvsu.edu). Please note that I cannot provide accommodations based upon disability until I have received a copy of the DSR issued memo. All discussions will remain confidential.

**Emergency Information:** Immediately proceed to the nearest exit during a fire alarm. Do NOT use elevators. Additional emergency information is available at <https://www.gvsu.edu/emergency>.

**Policies & Academic Integrity:** This course is subject to the GVSU policies listed at <https://www.gvsu.edu/coursepolicies/>. Students are expected to follow GVSU's Student Code (<https://www.gvsu.edu/studentcode/>).