University of Guelph - College of Biological Science - Department of Integrative Biology

COURSE OUTLINE

Biology of Fishes (ZOO*4330) – Winter 2014

Synopsis

This course provides a comparative examination of selected freshwater and marine fishes to illustrate the influence of aquatic environments on life styles, behavioral patterns, physiological responses, population biology and community structure. The use of niche, habitat and ecotope concepts in defining the role of fishes in representative types of aquatic ecosystems will be examined.

This course also provides a practical experience in the study of fishes. Using University collections of prepared and preserved specimens, students will develop and apply skills in identification and sampling, explore relations between species diversity and habitat, and investigate, through guided study, the extent of anatomical, skeletal, reproductive and morphological variation and its functional and evolutionary causes. [0.5 credit]

Prerequisite(s): 15.00 credits including (STAT*2040 or STAT*2230), ZOO*2090

Teaching Team

Professor

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Lab Instructor

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Teaching Assistant

Tba

Course Schedule

Lectures Monday / Wednesday, 12:30pm-1:20pm, location MACK Rm 230

Labs Wednesday, 2:30pm-5:20pm, SCIE 2303
Thursday, 2:30pm-5:20pm, SCIE 2303

Learning Objectives

Lecture Learning Outcomes

By the end of this course, students should be able to:

1. Have an increased understanding of the evolutionary origins of the major fish taxonomic Classes, with emphasis on the bony fishes.
2. Have a greater understanding of the genetic and environmental factors regulating reproduction in fishes.
3. Gain an understanding of the various 'modes' of reproduction in fishes.
4. Have knowledge of how abiotic factors influence adaptive capabilities in fishes.
5. Have greater insight into how growth is regulated in fishes.
6. Gain a heightened understanding of the various sensory modalities in fishes and how these anatomical and physiological adaptations interact in the social development of fishes.
7. Understand how the mechanisms discussed in point 6 above are influential in the speciation processes in fishes.

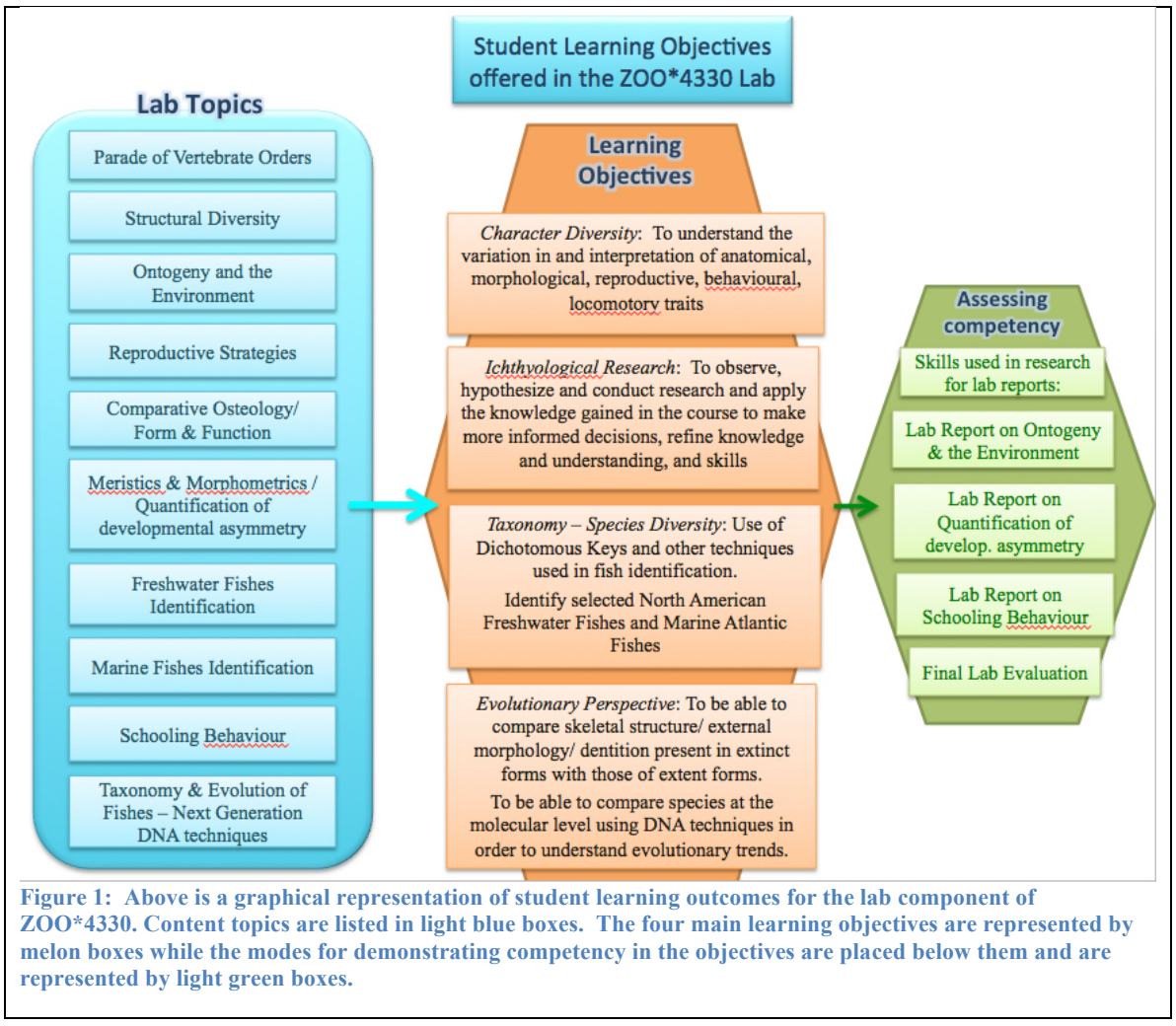

Figure 1: Above is a graphical representation of student learning outcomes for the lab component of ZOO*4330. Content topics are listed in light blue boxes. The four main learning objectives are represented by melon boxes while the modes for demonstrating competency in the objectives are placed below them and are represented by light green boxes.

Lab component Learning outcomes:

1. Students will develop meristic and mensural skills used to study the various aspects of fish biology.
2. Through laboratory studies, students will apply methods of sampling fish diversity, and will relate diversity to habitat variables.
3. Taxonomy exercises will allow students to become proficient in the use of dichotomous keys to assign fishes to taxonomic categories and North American specimens to Order, Family, and Species.
4. Laboratory studies will allow students to develop a thorough understanding of fish anatomy, to explore variation in morphology among different groups of fishes and to test hypotheses regarding their function and evolution.
5. Using class and individual data sets, students will hone their analytical-statistical skills as well as their writing skills.

Resources – Course Materials

Required Textbook:
Balon, E.K., D.L.G. Noakes, R. Danzmann & m. T. Rush. 2014. ZOO*4330 Ichthyology Primer. Department of Integrative Biology, College of Biological Science, University of Guelph, Guelph, Ontario, Canada.

It is also recommended that you obtain either of the following:
Nelson, J.S. 2006. Fishes of the World. 4th edition. John Wiley & Sons, Hoboken, New Jersey.
or
Moyle & Cech An introduction to Ichthyology. 5th edition.

CourseLink:
This course will make use of the University of Guelph's course website on D2L (via CourseLink). Consequently, you are responsible for all information posted on the CourseLink page for **ZOO*4330**. Please check it regularly.

Undergraduate Calendar:
This
is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. It can be found at:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/

Lab equipment:
Students will be responsible for providing their own dissection instruments, rulers, pencils, and laboratory notebooks.

Course Structure and Assessment

Course Structure

The course is divided into twelve weeks, with two lectures and one lab period per week. Lecture and lab topics are listed in the Lecture-Lab Schedule below:

Date *Week of*	**Lectures**	**Laboratories**
Jan. 6th	Introduction & Life-history terminology	Parade of Fish Classes & Orders
Jan. 13th	Evolution & Diversity - I	Structural Diversity
Jan. 20th	Evolution & Diversity - II	Ontogeny and the Environment
Jan. 27th	Sex determination & Sexual differentiation	Reproductive Strategies
Feb. 3rd	Genes & Environmental Influences on sexual differentiation	Comparative Osteology / Form & Function
Feb. 10th	Environmental Impositions, Mid-term Exam	Meristics & Morphometrics / Quantification of developmental asymmetry
Feb. 17th	(Winter break)	
Feb. 24th	Fish Growth & Development I	Freshwater Fishes Identification
Mar. 3rd	Fish Growth & Development II	Marine Fishes Identification
Mar. 10th	Reproductive modes & Social Interactions	Schooling Behaviour
Mar. 17th	Mate Choice & Ecology	Taxonomy & Evolution of Fishes – Next Generation DNA techniques
Mar. 24th	Mechanisms of Speciation	Final Lab Evaluation

It is incumbent on the student to inform the instructors of the course within the first two weeks of class if there is a conflict between a student's religious observations (Holy Days) and a scheduled lab component, or lecture / lab evaluations.

Lectures

Recommended readings will supplement the faculty lectures. There is no required textbook for this course, however a textbook is recommended. Students will be given opportunity and encouraged during lectures and laboratories to discuss questions arising from lectures and related readings. Students who miss lectures for any reason are responsible for the material covered.

Laboratories

Laboratory instructions will be provided online, and during prelab talks. You will need a copy of the manual: ZOO*4330 Ichthyology Primer. This lab manual will be made available to you the first week of classes by the Department of Integrative Biology.

Information will be posted on CourseLink concerning dates and times for purchasing the manual. Students will be responsible for providing their own dissection instruments, rulers, pencils, and laboratory notebooks. Laboratory exercises will include demonstrations of specimens and techniques, various audiovisual materials, and regular experimental and/or instructional activities by students.

Methods of Assessment

Grades will be assigned according to the standards outlined in the U of G Undergraduate Calendar. Refer to *Assignment of Grades* under *Course Policies* in the section following *Methods of Assessment*.

Course Grade

Your final grade in the course will be composed of:

Laboratory reports (3 @ 10% each)	30%
Final Lab Evaluation	20%
Midterm test	15%
Final (cumulative)	35%

Students will be held responsible for all materials given in lectures, laboratory classes, and as specific reading assignments unless otherwise stated. No unofficial deferments of any scheduled evaluation will be given. Students who miss the midterm or other assessment components for documented medical or other legitimate reasons will have their final marks pro-rated on the basis of completed evaluations. No make-up evaluations will be conducted. The final lab evaluation (exam) and the final exam must be completed in order to pass the course.

Laboratory Reports (worth 30%)

You will have the opportunity to submit three laboratory reports during the semester, each lab report is worth 10% of your final grade. Due Dates for the lab reports are as follows: Lab Report I (Ontogeny) – Feb. 14th ; Lab Report II (Asymmetry) – March 7th ; Lab Report III (Schooling) – April 4th . Reports are due by noon in Courselink's Dropbox, in document format (.doc or docx).

Each lab report MUST be written up as a scientific paper with an ABSTRACT, INTRODUCTION, MATERIALS and METHODS, RESULTS, and DISCUSSION section. Each report is to be a maximum of 5 pages long (double spacing and 12 pt font), and contain proper scientific referencing throughout. The style of the report MUST follow the format for publication given in the journal: Canadian Journal of Fisheries and Aquatic Sciences. Marks will be deducted if this format is not adhered to. Students are encouraged to provide information from other studies examining similar questions. References, Figures, Figure Legends and Tables that accompany the report are not counted in the 5 page limit.

Final Lab Evaluation (worth 20%)

The laboratory practical evaluation will be given during the regular laboratory session. The format will be of a station-to-station bell-ringer question/identification/ type. This assessment will not tend to favour simple regurgitation of factual material, but a course of this nature must of necessity involve the assimilation of a considerable body of factual information.

Midterm Exam (worth 15%)

The midterm test will be a written test of about 45 minutes duration and will be held *in MACK 230 on Feb. 12th*. The test will include all the material presented in class up to the preceding lecture period. The results from the midterm will constitute 15% of your final mark and will consist primarily of short answer type questions. Synthesis of concepts, rather than straight regurgitation of facts will be emphasized.

Final Exam (worth 35%)

The final exam will be a written, two hour exam held during the exam period. The exam will consist of definitions and short-answers based on all of the content covered in the course. You will be assessed on your ability to evaluate the information and interpret it in light of the studies you have examined in the lecture.

Summary of important dates

JAN 6 (Mon): first lecture in ZOO*4330, 12:30 pm

JAN 8-9 (Wed & Thurs): first lab in ZOO*4330, 2:30 pm

FEB 14 (Fri): Due date for first lab report – before noon

FEB 12 (Wed): Midterm

FEB 17 - 21 (Mon – Fri): Winter break: NO CLASSES

MARCH 7 (Friday): Course drop deadline (40th class day).
Due date for second lab report – before noon

MARCH 26-27 (Wed & Thurs): Final Lab Evaluation

APRIL 4 (Fri): Due date for third lab report – before noon

TBA: Final exam (Date & Time will be posted by the Registrar's Office)

Course Policies

Appropriate Use of Conferences

This course has been designed to foster interaction between students and with the instructors. The conferences provide a means for course members to share ideas, opinions, and resources. The use of these computer conferences is a privilege, not a right, which may be revoked at any time for abusive conduct.

Please show respect for the opinions of others at all times, even if you do not agree with their ideas. We encourage you to disagree, critique and add new insights, but this must be done in a positive manner. Discussions in the online conferences must be treated the same as face to face discussion. In the conferences others cannot see such things as facial expression and body language, both of which we normally take into account when talking face to face with someone. Therefore, be very careful in the phrasing of your contributions and responses, as they may be interpreted differently than what you had intended. Please respect your fellow students. You MUST NOT post racist, sexist, homophobic, or other similar remarks that are likely to cause offence. Please keep in mind that the conferences are public places. Anyone with access to the course website has the capability of seeing conference postings.

Assignment of Grades

Work in this course is evaluated according to the University of Guelph grading standards. For a definition of the numerical grades you receive please see Resolution 1 in the section on Grading Procedures under Grades in VIII: Undergraduate Degree Regulations and Procedures in the University of Guelph 2013-2014 Undergraduate Calendar.

- ***Link:*** See Resolution 1 under Grading Procedures in the Undergraduate Calendar for a description of grading standards used at the University of Guelph.

Grading rubrics will be used to illustrate the specific grading criteria used to evaluate the lab reports. These are available on CourseLink.

You may check your grades at any time during the semester through the Grades page on the course website.

Late Policy

Work that is handed in late will be penalized 10% for every day that it is late.

Absence and Illness If you are absent from classes during the semester, you will be expected to make up missed lecture and laboratory material on your own.

Academic Consideration

If you miss deadlines for medical, psychological, or compassionate reasons, please contact the instructor as soon as possible to make alternate arrangements. For more details about academic consideration see the section on Academic Consideration, Appeals and Petitions in the University of Guelph 2013-2014 Undergraduate Calendar.

- ***Link:*** See the section on Academic Consideration, Appeals and Petitions for details regarding academic consideration.

Academic Integrity

Although we do encourage you to share thoughts and ideas while studying for the course, all material submitted for grading MUST BE YOUR OWN work! The University takes a serious view of academic misconduct, including plagiarism. The penalties for academic misconduct are severe and can lead to expulsion from the University and the revocation/rescinding of a degree.

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

- ***Link:*** http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Course Philosophy and Roles

Pedagogical Values

This course aims to support the mission statement and the learning objectives set out by the University of Guelph in the Undergraduate Calendar. This means that this course will be research intensive and learner-centered. Ultimately we want students to be capable of self-assessment, critical inquiry, and active learning.

- ***Link:*** Read the University of Guelph Mission Statement in the Undergraduate Calendar.
- ***Link:*** Read the University of Guelph Learning Objectives in the Undergraduate Calendar.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.
For more information, contact CSD at 519-824-4120 ext. 56208 or email **csd@uoguelph.ca** or see the website: **http://www.csd.uoguelph.ca/csd/**

Teaching Philosophy

In support of the University Mission statement, we will adopt a learner-centered approach to teaching. In this course, that means that instructors are not the only ones responsible for depositing knowledge into the minds of students. Instead, you are expected to take an active role in your own learning. The teaching team will provide opportunities for you to learn independently and from one another, and will coach you in the skills needed to do so effectively. The lecture component provides the required content material for your understanding and enables you to build upon this knowledge. Metaphorically speaking, the lab instructor and teaching assistant will not be "the sage on the stage" but rather "the guide on the side", because research shows this method can lead to an increased motivation to learn, greater retention of knowledge and a deeper understanding of the material.

Teaching Team's Role and Responsibility to Students

In this course you can expect your instructors to…

- Clearly define the course learning objectives
- Provide well articulated activities that enhance learning
- Ensure timely and fair grading procedures
- Notify you of events, deadlines, announcements concerning grades, and other official information
- Provide and adhere to well defined policies and procedures as described in the course outline, and the Undergraduate Calendar
- Provide assistance, when asked, if you are having difficulties in the course
- Foster and uphold an environment of academic integrity and a love of learning

Your Learning Responsibilities

Your success in this course depends on your response to the opportunities this course offers you. As a student in this course, you are responsible for…

- Knowing the course learning objectives as covered in the lecture and lab components each week.
- Prepare for, attend, and review your lecture and lab components.
- Contact your professor if you have any difficulties with the course.
- Completing all required lecture and lab objectives and assignments.
- Reading the assigned resources on the course website and through e-reserve.
- Reading all announcements and other class material distributed in class or on-line.
- Accessing the Courselink regularly for important communications from the course

instructors or teaching assistants.
- Understanding and adhering to policies and procedures as described in the course outline, and the Undergraduate Calendar.
- Understanding grading procedures.
- Familiarizing yourself with the course schedule of dates with particular attention to deadlines.
- Initiating action, in advance of due dates, by consulting your instructor or program counsellor if extenuating circumstances affect your academic performance.
- Understanding what constitutes academic misconduct and refraining from it.

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Drop Date

The last date to drop one-semester courses, without academic penalty, for Winter 2014 is Friday, March 7, 2014. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Technical Requirements

The course web site provides the connection between you and your fellow classmates. When collaborating on class data, it is essential that you are able to connect properly to our course in CourseLink. For adequate interaction with the course web site please make sure that your computer meets the minimum requirements.

- ***Link:*** See the recommended System Requirements for use with CourseLink.

If you do not have these technical requirements, consider either upgrading your personal computer, or using a machine on-campus. Trying to use someone else's computer for the course may prove to be frustrating and difficult.

Please follow this quick System Check to determine if you have the right setup. (Results will be displayed in a new browser window).

- ***Link:*** Do a System Check to make sure that your computer is configured properly for this course.

Course Evaluation

Course Evaluation information (from the CCS website)
CCS now provides the U of G Online Course Evaluation System in a secure, online environment. End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions form part of the information used by Promotion and Tenure Committees in evaluating the faculty member's contributions in the area of teaching.
Course evaluations are now conducted through this web site. Login with your central email account login ID and password.
https://courseeval.uoguelph.ca/CEVAL_LOGIN.php

Occasionally course evaluations are conducted in class.

Please Note:
Instructors do **NOT** receive evaluations until the end of exam period. Furthermore, evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments

NOTE: This outline is distributed for information and is available via CourseLink. Failure to obtain a copy of this outline in the first instance, or to read and respond accordingly to its contents, are not acceptable grounds for complaints after the first week of classes.
In particular, no changes in the marking, grading or evaluation scheme will be made without the agreement of the professor, lab instructor and the written consent of all students enrolled in the course. There will be no unofficial deferments of any scheduled evaluation. Students who miss any evaluation for documented medical or other legitimate reasons will have their final grades pro-rated on the basis of completed evaluations. No make-up evaluations will be conducted during the semester. Students who miss laboratories for any reason are responsible for the material covered.