COURSE TITLE: FISH 5440/6440, Fish Anatomy & Physiology (w/ Laboratory)
CREDIT HOURS: 4 credit hours, including lecture and laboratory
LECTURE TIME / LOCATION: T-Th, 8:00-9:15 am / Swingle Hall Rm 303
LABORATORY TIME / LOCATION: W, 1:00 pm-5:00 pm / Swingle Hall Room 302
OFFICE HOURS / LOCATION: open or call for appointment
REQUIRED PREREQUISITES: POI (see contact info below) or FISH 5380
INSTRUCTOR: Dr. Ash Bullard (office phone: 334-844-9278; sab0019@auburn.edu)

TEXTS & MAJOR RESOURCES:

Hill, R. W., G. A. Wyse, and M. Anderson. 2008. Animal Physiology, 2nd edition. Sinaeur and Associates, Sunderland, MA.
Barton, M. 2007. Bond's Biology of Fishes, 3rd ed. Thomson/Brooks Cole, Belmont, CA.
Grizzle, J.M. & W.A. Rogers. 1976. Anatomy & Histology of Channel Catfish, Agricultural Experiment Station, Auburn, AL.
Nelson, J.S. 2006. Fishes of the World, 4th ed. John Wiley and Sons, Hoboken, NJ.
Kardong, K.V. 2008. Vertebrate Comparative Anatomy, Function, Evolution, 5th ed. McGraw Hill, Boston, MA.
Kardong, K.V. & E.J. Zalisko. 2008. Comparative Vertebrate Anatomy: A Lab Dissection Guide. McGraw Hill, Boston, MA.

COURSE DESCRIPTION: "Anatomy" comes from the Greek "*ana*" meaning 'apart' and "*tome*" meaning 'a cutting,' while "Physiology" means the study of the normal function of living things. Hence, "Fish Anatomy & Physiology" is the deconstruction ('cutting up') of fishes to learn about their nature and normal function. Such studies are valuable to students of the aquatic sciences because fishes comprise most of the vertebrates that range in freshwater, estuarine, and marine environments. Moreover, because their physiological systems and cellular responses are comparable to those of mammals, fishes are gaining status as valuable model organisms that inform about the mechanisms involved in infectious and non-infectious diseases of medical and veterinary importance. Familiarity with fish anatomy & physiology also serves those interested in monitoring and conserving aquatic ecosystems because the presence of sick fish may indicate environmental perturbation, water pollution, a disrupted food web, or an invasive pathogen. Because phylogenetically-related fishes exhibit similar, homologous morphological features and physiological adaptations, the most widely accepted vertebrate phylogeny (Nelson, 2006) will serve as the organizational underpinning for the presentation of both lecture and laboratory materials. Because fishes and 'higher vertebrates' share a common ancestor, the course is inherently comparative in nature. As a result, this course is a synergism of vertebrate phylogeny, fish systematics, functional morphology, and comparative anatomy and physiology.

COURSE OBJECTIVES: Through a series of lectures and complementary laboratory exercises students of Fish Anatomy & Physiology will gain proficiency in the identification of gross and microscopic anatomical features of fishes while gaining an appreciation for the functions of the primary physiologic systems of fishes.

COURSE CONTENT:
Week 1-2 Foundations of physiology & ichthyology
Weeks 3-14 Anatomy and Physiology of major systems in fishes
Week 15 Review, Student Presentations

UNDERGRADUATE COURSE REQUIREMENTS / EVALUATION / GRADING POLICY: No grade is 'curved.' No 'extra credit' is allowed. Your grade (see "grading scale"), without exception, will be calculated by adding the points earned for each of the 6 items listed below and dividing that sum by 100 (= the total possible points). The best way to do well in this course is to arrive for lecture and laboratory meetings alert and organized and study.

Lecture Examination:	30 possible points
Lecture Final Examination:	30 possible points
Lecture Quizzes:	10 possible points
Laboratory Assignments:	10 possible points
Laboratory Final Examination:	20 possible points

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

JUSTIFICATION FOR GRADUATE CREDIT *(grading represents a 20% difference between graduate and undergraduate students)***:** Earning graduate credit for this course means that your grade is based on more points, i.e., more is expected and required of you regarding academic and professional leadership. Because the trait "leadership" is difficult to quantify, you will be judged by your ability to frame a novel research hypotheses relating broadly to fish anatomy and physiology. This ability will be demonstrated in a 10-page manuscript (10 pt, Arial, 1" margins all around, double-spaced, not including references and figures, worth 25 points) and a complementary 15-minute PowerPoint/Keynote presentation of your chosen topic, also worth 25 points. The written paper and presentation will *each* count towards 10 points on your overall grade, i.e., the total amount is 20 points for both the paper and presentation. The topic can, and probably should, be related to your graduate research topic but must relate to the lecture and laboratory materials in the *broad sense* (i.e., be creative!). The term paper must be formatted as per the "Guide to Authors" for the Journal of Parasitology, no exceptions. There are no post-semester re-writes of term papers, and I expect that the final product is a concise, journal-formatted, original analysis of your selected topic. Your oral presentation of the topic will be scheduled during a lecture or laboratory period in the final weeks of the semester, depending upon how many graduate students take the course. You will be responsible for delivering a copy of your term paper draft to each member of the class (including me) the week before you present your paper. Members of the class will be encouraged to provide constructive criticism of your topic, and it is expected that you will be able to promote dialogue among your peers and field questions from them by introducing data from the peer-reviewed, primary literature published on your topic.

GRADUATE STUDENT COURSE REQUIREMENTS / EVALUATION / GRADING POLICY: All course requirements, evaluations, and grading policies for undergraduate students apply to graduate students enrolled in this course (see section entitled "UNDERGRADUATE COURSE REQUIREMENTS / EVALUATION / GRADING POLICY").

Lecture Examination #1:	30 possible points
Lecture Final Examination:	30 possible points
Lecture Quizzes:	10 possible points
Laboratory Assignments:	10 possible points

Laboratory Final Examination:	20 possible points
Term paper:	25 possible points
Research Presentation:	25 possible points

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

COURSE POLICY STATEMENTS *(see Tiger Cub and the official handbook of Auburn University at http://www.auburn.edu/tigercub/)*:

ATTENDANCE POLICY: You are expected to attend class. You will not be penalized directly for missing class, i.e., there is no mandatory attendance. However, keep in mind that there are no "make-up" quizzes for unexcused absences so missing an unannounced quiz will result in a 0% score for that quiz.

PARTICIPATION & ASSIGNMENT EXPECTATIONS: I expect that you will participate fully and, as a result, do well in this course. Although intuitive, below is a further explanation of the above listed grading regimen.

1. **Lecture Examinations.** There will be a total of 2 closed-book lecture exams (including the final exam) for this course. The exam material comes from my lectures, the primary course textbook, lecture handouts, classroom discussions, and select secondary sources of course information. In a nutshell, the exams can include anything we've talked about in class or read outside of class. Hence, it behooves you to ask questions about things that you do not understand once you realize that you do not understand.
2. **Quizzes.** I will occasionally give an unannounced quiz. These quizzes are intended to help you 'know what to expect' for the lecture examinations. They are also intended to help you stay abreast of lecture and reading content. The syllabus can, and likely will, change depending on the many variables that can affect any course during a routine semester.
3. **Participation.** The concept of 'shyness' is not a valid excuse for abstaining from class discussions because without communication there is no learning and no advancement of knowledge. Moreover, consider that there are few or no positions in any society wherein you will be allowed to exist in isolation and forgo interacting and communicating with your peers. Doing "science" is an especially social endeavor because scientists tend to compulsively communicate their findings and observations with their colleagues and students through oral (lectures, seminars, professional society meetings, routine communications) and written (primary literature) correspondence. Becoming comfortable with both of these activities is one overriding goal for this course because it is requisite for being a professional scientist.
4. **Laboratory Assignments.** Your performance in laboratory will be judged based on your involvement in working toward achieving the laboratory objective. There will be several instances wherein students are expected to work in pairs or groups, but each student is graded separately. Some laboratory meetings will be used for seminar-type discussions of selected primary literature on Fish Anatomy and Physiology. Participation for this aspect of the class should be based on readings of cited references in the focus paper, i.e., participation does not comprise using the seminar discussion for discovering the content of the focus paper that you were expected to read before class.

5. Laboratory exam. There is a single laboratory exam. It will be a mixture of a laboratory practical and a written exam. The material covered will be derived from laboratory activities and information derived from the seminar-type meetings.

COURSE EVALUATIONS: A midterm and final course evaluation will allow you to submit anonymous constructive criticisms on how to improve this course. However, the quickest way to solve a problem is by bringing it to me as it occurs during the semester. We can work it out and make corrections then and there.

SCHEDULE POLICY (CHANGES TO SCHEDULE): The lecture and laboratory schedules are subject to change and probably will change. Those changes will be announced during the lecture period. It is the student's responsibility to stay abreast of such changes. Obviously, the easiest way to do that is to attend each lecture class. I am not obligated to answer e-mails requesting information about scheduling.

CONDUCT and CHEATING POLICIES: University guidelines and procedures will be followed. They can be found in the University's Tiger Cub.

E-MAIL POLICY: Here are five recommendations for emails regarding this course: concise emails will elicit the most rapid response!

- Your first and last name should be included in the body of the email; your email address does not suffice because it is an alias, not a proper name.
- If multiple recipients are listed in the "TO:" and/or "CC:" lines of your message, the text of your message should nevertheless specify (A) to whom you are sending information and/or (B) from whom you are requesting information. The latter avoids a 'no response' by the targeted recipient(s), who do not wish to duplicate effort(s).
- The subject line should include a helpful synopsis of why you are emailing, e.g., "stuff" and "question" are not helpful.
- The text should comprise complete sentences, or at least employ capital letters and periods enclosing a word string that communicates a subject-verb concept.
- Dictionary words should be used: email is not "text-messaging;" hence, your email should lack an abundance of acronyms.

ACCOMODATIONS FOR DISABILITIES: Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Halley Center, 334-844-2096 (V/TT) or email: scw0005@auburn.edu.

WITHDRAWING FROM COURSE: Departmental and University policies are followed herein; see appropriate semester schedule for those policies as well as their respective deadlines.

2010 H1N1 INFLUENZA ("*SWINE FLU*") CONTINGENCY: COURSE COMPLETION & SOCIAL DISTANCING: H1N1 Influenza is a potentially life-threatening viral pathogen of humans that can spread rapidly in aggregated settings such as a classroom, academic building, or university.

Understand that:

1. Auburn University is likely to face a full closure of the University during the semester.
2. Auburn University will likely be faced with a large number of absences.
3. For any individual, the H1N1 flu has a 5-7 day life cycle, meaning that, if infected, you may be expected to miss a full week of classes.
4. Absences will probably continue through the fall and into the spring term.
5. For individual students and faculty members, this need not be a semester-ending event, but it will be a frustrating and disruptive one in any case.
6. The office of Information Technology has been instructed to provide special support for the academic community so that education can continue, despite multiple absences of students and instructors, and ACES-Ag IT is coordinating this effort.

Hence, you as a student should stay alert and be advised that relevant information pertaining to the H1N1 status of AU campus will be available on the Auburn University web page (http://www.ag.auburn.edu/adm/faculty-staff/H1N1.php)

If you feel sick and are experiencing flu like symptoms (e.g., fever, cough, sore throat, runny or stuffy nose, body aches, headache, chills, fatigue):

1. STAY HOME= DO NOT COME TO CLASS
2. Avoid contact with others as much as possible.
3. If you leave home and expect to be near others, WEAR A FACEMASK.
4. If possible, do not leave your home until 24 hrs after your fever is gone except to get medical care or for other necessities.
5. E-mail me (sab0019@auburn.edu) and tell me you are sick

**Do not concern yourself with how you will "make up" the work; your instructor will provide a regime for making up work and for you to receive the required course materials, i.e., if you are diagnosed with flu, you will be given a chance to get back on track. In that case, the instructor will require you to provide: A) a written excuse from your health care provider or B) your health care provider's name and phone number to confirm your health status.

Examples of work load compensation in the event of a flu outbreak are:

Special, extended office hours for students recovering (non-infective) from flu.
Email correspondence to transmit lecture and laboratory text materials.
Phone-based, pre-scheduled question-answer sessions.
Make-up periods for lecture and laboratory quizzes and exams.

Questions about H1N1 flu? See the Center for Disease Control's (CDC) website at http://www.cdc.gov/h1n1flu/sick.htm and http://www.cdc.gov/h1n1flu/ or ask your instructor (who happens to also be a parasitologist).