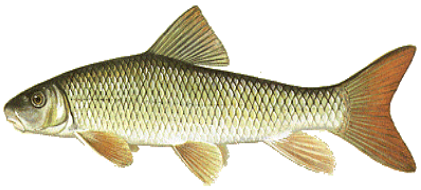
Fish Population Dynamics (3 credit hours)
Aquaculture/Fisheries (GAQF) 5325
University of Arkansas at Pine Bluff
Fall semester, 2008



Instructor: Dr. Michael A. Eggleton
Office: Woodard Hall, Rm 220 (enter through 211)
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E-mail: meggleton@uaex.edu

Class Times: Lecture: Tuesday/Thursday, 8:00am-9:15am, Woodard Hall, Rm 257
Other times and locations announced as needed.
Turn cell phones and pagers off during ***all*** class activities.

Office hours: 9:00am - 11:30am, Monday and Wednesday.
Other hours by appointment, though I am usually around every day. Feel free to email or call anytime. If I am unavailable, I will return your call as soon as possible.

Prerequisite: College algebra and general ecology; introductory statistics is recommended

Required Text: None – I will be provide excerpts from other texts throughout the semester.

You must provide a working email address that you check regularly. Announcements and other basic information about this course will sometimes be distributed this way.

1) COURSE OVERVIEW

Course Objectives:

The main objectives for this course are to: 1) expose students to basic concepts in fish population dynamics, 2) provide students hands-on experience using standard population dynamics models and statistical software commonly used by fisheries biologists, and 3) train students in interpreting model and statistical results with regard to analysis of fish population data.

Course Content:

This course is designed for students to establish an integrated professional foundation in population dynamics and will provide the necessary tools for assessing recreational and commercial fisheries for management purposes. Methods for estimating population parameters (e.g., size, density, growth, recruitment, and mortality) will be presented.

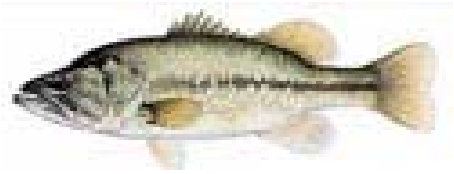
This course is highly quantitative and students will be required learn and use a variety of modeling and statistical techniques to interpret basic fisheries data. Students also will use FAST (Fishery Analyses and Simulation Tools) to predict yield and catch composition for recreational and commercial fisheries.

2) COURSE GRADING

Composition of Total Grade:	**%Total grade**
Mid-Term Exams (100 points each)	**27**
Comprehensive Final Exam (150 points)	**20**
Homework problems (8) (50 points each)	**53**
	100% (750 points)

Grade Assignment:
Final grades will be based on the total points accumulated from all exams and exercises. Grades will be assigned according to the following schedule:

A = 90.0-100%
B = 80.0-89.9%
C = 70.0-79.9%
D = 60.0-69.9%
F = 0-59.9%



Exams:
As listed above, there will be two (2) 100-point mid-term exams during the semester, and a comprehensive final exam worth 150 points. These exams will be comprised of short answer, essay, and problem-solving questions. Exams will cover all information presented in class lectures, required readings, laboratory exercises, and homework problems. Calculators will be needed for all exams.

Make-up exams will not generally be given. If an exam is missed without a valid excuse, you will receive a zero on that exam. Make-up exams will be considered under extreme circumstances (e.g., death in the immediate family, student illness), provided appropriate documentation can be provided to support such. The final decision lies with the instructor. Every effort should be made to take exams at their properly scheduled times. If an exam must be missed, the student should notify the instructor or departmental secretary (Delila) *prior* to the scheduled exam. If the instructor decides a make-up exam is warranted, it will be scheduled at the convenience of the instructor (this may mean evenings or even weekends).

Homework assignments:
There will be several homework assignments given during the semester. These assignments will

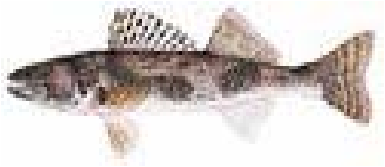
pertain to the fisheries concepts and models presented and discussed during lectures. This course does not have a formal lab, but we will do some lab-like assignments. Assignments will encompass doing hand calculations, performing statistical analyses, and/or running computer models on fisheries data that are provided. Occasionally, you may need to obtain references outside of regular class. Homework assignments will due approximately one (1) week after they are assigned. Given that this is a graduate-level course, I will be flexible as much as possible with regard to field schedules of individual students, conference attendance, and other professional or scholarly endeavors.

Extra credit opportunities:
From time to time during the semester, I will offer extra credit opportunities. I will submit a question by email to the whole class. The first student who returns the correct answer can earn extra credit points. It may be something in the textbook or maybe something else fisheries-related.

***** Any form of cheating will be handled in the appropriate manner according to university policy. A zero on the assignment is the minimum repercussion. Cheating will result in a zero on the assignment at a minimum and possibly worse. Reminder - information copied directly from the Internet and presented as original work is cheating.**

<u>Test rules</u>: Book bags in the floor; no jackets, hats, sunglasses, laptop computers, or cell phones allowed out.

<u>Homework rules</u>: You can work together but finish them alone. It is very obvious when a student copies another's work and then rephrases or rewords small parts of it. Ditto for copying materials off of the Internet. I can easily use Google to locate Internet materials that have been copied verbatim.



UAPB and SAFHS Class Attendance Policy
The University requires regular class attendance of all students. While attendance and tardiness are primarily a student-teacher relationship, the University has a concern in the proper fulfillment of such obligations by the student.

1. At the beginning of each class period, the instructor will take the roll and note attendance or non-attendance in the roll book. Each course syllabus will carry a stipulation regarding tardiness and absences.
2. When a student accumulates as many unexcused absences as the number of credit hours represented by the course, the teacher will notify the student and document the notification.

3. An absence is excused when a student is absent from class due to participating in

programs, activities, etc. that are sponsored by the University and verified by the sponsor, or such as death in the immediate family, a judicial case, or serious illness, etc. These absences will be excused only when the student presents official documentation of the situation to the teacher. All other absences are unexcused.

4. When a student misses classes in excess of the number outlined in item 2 above, whether due to negligence or some other reason, the instructor will warn the student that additional absences may result in failure to pass the course.

5. Each instructor is free to establish their own penalties for lack of class attendance.

Fish Population Dynamics policies
Consistent attendance is mandatory. However, as this a graduate-level course and students are invariably involved in research, conference attendance, etc., I will be as flexible as possible. Attendance will be taken for each class and lab session. This is required by the University and reported periodically for financial aid qualification. Each student is responsible for all material presented in missed lectures and labs, and assignments made therein. If you miss a scheduled class period, you need to locate a fellow student to obtain missed material.

Pursuant with UAPB policy for a 3-credit course, if a student has four (4) unexcused absences, the instructor will call a meeting with the student to make him/her aware of the situation. With additional unexcused absences, the student will incur a letter-grade penalty at the end of the course. In the case of excessive absences, the instructor will likely recommend that the student withdraw from the class and enroll again the next time it is offered.

****Remember—all absences are unexcused until the student provides appropriate documentation. The instructor is not responsible for locating the student after missing class and informing him/her of missed material or assignments or seeking an excuse for the absence**. *This is your responsibility.*

Students with disabilities:
It is the policy of UAPB to accommodate students with disabilities, pursuant to federal law, state law, and the University's commitment to equal educational opportunities. Any student with a disability who needs accommodation, for example in seating placement or in arrangements for examinations, should inform the instructor at the beginning of the course. The chair of the department offering this course is also available to assist with accommodations. Students with disabilities are also encouraged to contact Mr. Ray Watley, Office of Veteran Affairs and Disability Services located in Caldwell Hall, Suite 205, Phone (870) 575-8293.

3) INSTRUCTIONAL APPROACH

Teaching Model and Strategies:
Fish Population Dynamics is taught at the graduate level only, and is a very hands-on course with a fairly traditional formula. Basic information will be presented during lectures. Live demonstrations and hands-on experience will occur during class. Exercises will integrate

material presented in lectures with standard models, statistical approaches, etc. used in the fisheries discipline, with much emphasis placed on data interpretation. Exams and homework assignments will serve to validate learning.

Instructional resources:
We will use some Internet resources, but will mostly use basic “canned" computer programs and models and statistical software that are used by fisheries professionals for such purposes.

Bibliography:

Guy, C.S. and M.L. Brown. 2007. Analysis and interpretation of freshwater fisheries data. American Fisheries Society, Bethesda, Maryland.

Gotelli, N.J. 2001. A primer on ecology, 3rd edition. Sinauer Associates Publishing, Sunderland, MA.

Haddon, M. 2001. Modeling and quantitative methods in fisheries. Chapman and Hall/CRC Press, Washington, D.C.

Kohler, C. C., and W. A. Hubert, editors. 1999. Inland fisheries management in North America, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Murphy, B. R., and D. W. Willis, editors. 1996. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Quinn, T.J. and R.B. Deriso. 1999. Quantitative fish dynamics. Oxford University Press, Oxford, England.

Ricker, W.E. 1975. Computation and interpretation of biological statistics in fish populations. Fisheries Research Board of Canada, Bulletin 191.

Walters, C.J. and S.J.D. Martell. 2004. Fisheries ecology and management. Princeton University Press, Princeton, New Jersey.

General Course Outline: (subject to change)

My goal is cover all of the material listed below. However, I reserve the right to alter the scheduling or chronology of materials if I deem it necessary for the good of the whole class. This would only be done to accommodate student attendance at a conference or a outside guest lecturer.

1. Introductory Material
    - -course goals
    - -what is a fishery?
    - -principles of population dynamics
    - -what is a model?
    - -stock assessment and fisheries management

2. SAS (Statistical Analysis Systems) and Excel
    -linear regression primer
    -basic functions of Excel
    -program files, data files, output files, log files, etc. of SAS
    -basic programming code for data reduction and statistical analysis
    -basic interpretation of outputs

3. Population Size
    -estimation techniques and confidence intervals
    -area density method
    -change in ratio method
    -depletion methods
    -mark-recapture models

4. Population Growth and Condition
    -rates of increase (finite versus instantaneous)
    -derivation
    -fish production
    -growth models
    -estimation techniques and confidence intervals
    -calculation of indices of fish condition

5. Age-Growth Relationships
    -fish age-and-growth estimation techniques
    -backcalculation of length at age
    -reporting fish growth
    -models of fish length, weight, and age
    -comparison of growth rates using linear and nonlinear methods

6. Mortality
    -finite and instantaneous rates
    -fishing and natural mortality computation
    -compensatory versus additive mortality
    -estimation techniques and confidence intervals

7. Recruitment
    -definitions
    -estimation techniques and confidence intervals
    -stock-recruitment relationships
    -influence of environmental factors
    -stochastic methods

8. Fish Population Modeling
    A. graphical
        -fishery surplus production

-yield-per-recruit models

B. deterministic
-Ricker tabular model
-Beverton and Holt equilibrium yield model
-Graham-Schafer surplus production curve

C. stochastic
-use and misuse of stochastic models
-population cycles in fishes
-GIFSIM
-MOCPOP
-Excel Poptools

D. FAST (Fishery Analysis and Simulation Tools)

9. Fish Bioenergetics (optional)
-definition of terms
-uses of bioenergetic models
-estimation techniques and confidence intervals
-influence of environmental factors
-Wisconsin fish bioenergetics model