BOTANY/ZOOLOGY/FORESTRY 460 - GENERAL ECOLOGY
FALL 2007

Lecture Instructor: Stanley Dodson

- Born in Illinois, grew up in western Colorado,
- Undergraduate at Yale
- Graduate school at U of Washington, Seattle; has been in Madison since 1970.
- Married (biologist, computer programmer), one daughter (insurance investigator).
- Zoology professor
- Area of academic research is aquatic ecology, focusing on zooplankton, especially predator-prey interactions, community ecology, toxicology, and taxonomy. Research is in lakes and ponds in Wisconsin, Colorado, Utah, Alaska, Germany, & Mexico.

Office: 444 Birge Hall
Phone: 262-6395 but I prefer email
email: <sidodson@wisc.edu>
http://www.wisc.edu/zoology/faculty/fac/Dod/Dod.html
Office hours: 10-12 am Tuesdays or by appointment via email

Other Staff:

Sarah Klionsky, Teaching Assistant

- Area of academic research is methods of invasion and dominance by exotic invasives; how humans interact with and perceive invaded systems.

Office: 237 Birge Hall
Phone: 265-2191
email: <klionsky@wisc.edu>, preferred contact
Office hours: TBD or by appointment

Jeremiah Yahn, Teaching Assistant

- Area of academic research is herpetology, modeling based upon first principles, and the physiological side of ecology.

Office: 211 Zoology Research; will hold office hours in 110 Birge (the lab room)
Phone: 262-0029
email: <jyahn@wisc.edu>, preferred contact
Office hours: TBD or by appointment

Susan Will-Wolf, Laboratory Coordinator

- Born and raised in Missouri
- Undergraduate at Grinnell College, Iowa
- Graduate school at U of Wisconsin-Madison; in Madison since 1968.
- Married (science writer), son and daughter are both ecologists.
- Faculty Associate and Senior Scientist in Botany
- Areas of academic research are community ecology and lichen ecology, including forest dynamics and quantitative methods.

Office: 317 Birge Hall
Phone: 262-2754
email: <swwolf@wisc.edu>
Office hours: by appointment

COURSE LOGISTICS

Lecture Exams:
There are two one-hour exams during class period as listed in the lecture schedule: Monday October 15 and Monday November 12. The two-hour final exam is Tuesday, December 18, at 2:45 pm, after classes are over. Questions on the hour exams include graph analysis, multiple choice, matching, map identification (machine graded), and short essays. On the final, there will be more detailed questions on the last part of the course, and more general questions covering all course material. Exams are cumulative, in so far as it is necessary to understand or know material from earlier material to explain later concepts.

Exams given during the semester meet in the lecture room, B302 Birge Hall.

Missing Exams:
We expect you to take the exams at the scheduled time. If it is absolutely not possible, contact Professor Dodson or Dr. Will-Wolf before the scheduled exam about alternate arrangements for taking the exam. If you have a special request for taking tests (such as needing more time), or if you have a reason to think that you may need special consideration during exams, please let me know at the beginning of the course (such as immediately after this lecture). A written note is required.

Grading:

Lecture take-home assignments and quizzes	10%
Lecture Exams	30% (15% for each of two during the semester)
Final (Comprehensive)	20%
Lab	40% (15% lab writing assignments, 5% lab quizzes, 5% discussion participation, 15% lab exam - open book)

Class web site: the Learn@UW class web site and <http://botit.botany.wisc.edu/courses/460/>

Laboratory Manual - required:
Available from ASM StudentPrint, B114 Memorial Union (near Hoofers and the Rathskellar). Phone 262-6216; Hours Monday-Friday 9:30 am - 6:30 pm. 3-hole punch format, cost $7.60.

Laboratory Details: Laboratory attendance is mandatory. Laboratory policies are explained at the beginning of the lab manual.

Laboratory/Discussion sections meet in 110 Birge Hall starting the week of September 10.

If you have a conflict with a lab or the lab exam, contact the laboratory coordinator and lab Teaching Assistant at least 2 weeks BEFORE the conflict. With permission, you may be able to attend another lab day. For emergencies, contact the appropriate person ASAP.

ECOLOGY 460 - SPECIFIC & MEASURABLE GOALS FOR THE COURSE

By the end of the course, the student will be able to: **Think like an ecologist, using cases, models, and equations, and will be familiar with the languages of ecology.**

KNOWLEDGE

- Distinguish between "ecology", "environmentalism", and "conservation".
- Distinguish between a null hypothesis and an alternate hypothesis.
- Distinguish testable from un-testable hypotheses.
- Explain the meaning of the "alpha" or "p" value used in statistical analysis of data.
- Explain the value of replication and large sample size in statistical analysis.
- Define six different perspectives in ecology (kinds of ecology: community, ecosystem, landscape, physiological, population, biome), using a characteristic graph and the language appropriate to each perspective.
- Distinguish "modern" from "post-modern" ecology.
- Tell, from memory, the value of $\ln_e 2$, $\log_{10}$ of 3, 5, and 10^A .
- Explain the importance of essays in Aldo Leopold's Sand County Almanac.
- Distinguish species concepts (morphological, biological, molecular, and functional).
- Use examples to distinguish scale dependence from scale independence, for spatial & temporal scales.
- Explain how different species concepts are used in six different ecological perspectives.
- Be able to correctly use the language and concepts appropriate to six ecological perspectives.
- Locate the general position of the major biomes on a world map.
- Explain the greenhouse mechanism and components of global warming.
- Explain how ecological interactions lead to observed community structure.
- Distinguish between neutral and niche community assembly.

APPLICATION

- Calculate the median, mode, average and variance for a group of numbers.
- Illustrate the concepts of average and median by describing a set of numbers which has very different values of median and average.
- Relate temperature and precipitation data to the appropriate biome on a climatograph.
- Use Surface/Volume and Edge/Area logic to answer ecological questions.
- Convert numbers between powers of ten and the logarithmic equivalents.
- Find x,y positions on a log-log scale graph.
- Calculate population doubling time, given "r" or the annual percent change in population, or vice versa.
- Calculate one component of the Bio-energetics model, when given values for the rest of the components.
- Convert a visual image into a grid map of land cover, using appropriate scale, resolution, and extent.
- Fill in missing data (numbers and/or labels) in trophic structures, food webs, and biogeochemical cycles discussed in class.
- Use life table calculations to calculate per capita net reproductive rate "R_0", Generation time "T", and the instantaneous rate of population growth "r".
- Describe multivariate analysis techniques for interpreting complex data sets.
- Be able to read a scientific paper and explain what the paper is about.
- Apply the feedback model to ecological problems.
- Relate the interaction matrix to organisms in ecological systems.
- Analyze ecological interactions using the concept of coevolution.
- Be able to draw, label, and interpret appropriate graphs for major ecological concepts.

SYNTHESIS

- Compose a null hypothesis, given an ecological question.
- Design a testable hypothesis, given an ecological question.

- Evaluate a null hypothesis, given a “p” value.
- Interpret population equations and graphs for exponential growth, logistic growth, and doubling time.
- Use the exponential and logistic models to answer questions about population dynamics.
- Use life table calculations to explore life history strategies, such the consequences of population age structure and age of first reproduction.
- Analyze life history strategies using Kitchell’s Bio-energetic Model.
- Analyze an island biogeography graph, or create an island biogeography graph from a description of immigration and extinction rates.
- Evaluate the credentials of an ecologist, using appropriate resources.
- Integrate different ecological perspectives to compose an interdisciplinary research proposal, using the appropriate ecological language.
- Analyze physiological questions using the logic of the mass-specific metabolic (Bio-energetic) rate model.
- Identify the main points of a talk by an ecologist, and relate the points to one or more ecological perspectives. (Talk addressed at the level of the Zoology Colloquium).
- Be able to debate different perspectives (including your own) on an ecological issue.
- Be able to link adaptation to ecological concepts,
- Compare the implications of the interaction matrix in the contexts of population and community ecology.
- Correctly use ecological concepts to interpret ecological information.