1-2003

BIOL 304.01: Ornithology

Richard L. Hutto
University of Montana - Missoula, hutto@mso.umt.edu

Karen Short
University of Montana - Missoula

Biology 304, Ornithology

Course Syllabus, Spring 2003

Profs:	R. L. Hutto hutto@selway.umt.edu	Office:	HS 211	Office hours:	MW 11-12
	Karen Short kshort@selway.umt.edu		HS 203		F 11-1
TAs:	Bruce Robertson bruce@selway.umt.edu		HS 203		Tu 10-12
	Ty Smucker tsmucker@selway.umt.edu		HS 203		W 2-4

day		lecture topic	reading*	laboratory/field
Jan 27		Course overview; policies	xxi-xxvii	
29		Diversity of birds	3-20	Intro.; Topography
31		Origin of birds	21-43	
Feb 3		Speciation; zoogeography	527-552	
5		Bird flight—origin	93-113	Taxonomy
7		Bird flight—mechanics		
10		Bird flight—ecology		
12		EXAM I		Feathers
14		Molt	65-92	
17		HOLIDAY		
19		Plumage coloration I	203-232	Osteology
21		Plumage coloration II		
24		Special senses	186-202	
26		Brains and Behavior	177-185	Internal Anatomy I
28		Migration: patterns, ultimate causes	287-307	
Mar 3		Migration: proximate causes	263-285	
5		Orientation and navigation	309-325	Internal Anatomy II
7		Winter ecology of migrants		
10		EXAM II **(last day to withdraw**)**		Birdwatching hints
12		Territoriality	328-333	TH Eve. EXAM I
14		Coloniality		
17		Mating systems I		
19		Mating systems II		Campus walk
21		Vocal communication I	233-260	

day		lecture topic	reading*	laboratory/field
24		SPRING BREAK		
26		SPRING BREAK		SPRING BREAK
28		SPRING BREAK		
31		Vocal communication II		
Apr 2		Eggs, nests	367-391	Field Trip, 7-11 am
4		Brood parasitism	458-465	(Sat. trip = 5 Apr)
7		Clutch size	364-366; 496-502	
9		Incubation; parental care	391-401; 425-457	Bird ID review
11		Helpers; communal breeding	466-477	
14		EXAM III		
16		Foraging ecology—flocks	163-173; 335-346	Field trip, 7-11 am
18		Niche theory; coexistence	561-572	(Sat. trip = 19 Apr)
21		Habitat selection I		
23		Habitat selection II		Bird ID review
25		Fire ecology		
28		Population biology	507-525	TH Eve. EXAM II
30		Patterns of bird diversity	553-564	Field trip, 6:30-11 am
May 2		Island biogeography	573-580	(Sat. trip = 3 May)
5		Forest fragmentation		
7		Landscape ecology		
9		Conservation issues	581-616	Field Quiz, 7-11 am
16		FINAL EXAM, 10am		(Sat. trip = 10 May)

* page numbers from Gill (1994. Ornithology. W. H. Freeman and Co., New York, NY)

** Last day to drop courses with instructor/advisor signature on a drop/add form. After 10 March 2003, students must petition to drop, add, or to make changes of grade option, credit, or audit status. The petition MUST be accompanied by documentation of extenuating circumstances. These policies are described on pp. 19-20 of the 2002-2003 UM course catalog and further detailed in the following section, *Course Policies and Expectations of Students.*

COURSE POLICIES, AND EXPECTATIONS OF STUDENTS

Lectures—I use a traditional lecture format, but allow students to devote full attention to listening by making my notes available through electronic reserve at the library (http://eres.lib.umt.edu/). Your password for access to Biology 304 materials is "birdy."

Reading—the reading in Gill (1994) is meant to complement lecture material. There will be no testing on book topics that are not also covered in lecture, unless otherwise stated. If you really want to get up on what's happening in ornithology these days, read the current journals and popular magazines listed in the "Selected Ornithological References" handout.

Laboratory—these sections meet for 2 hours per week unless there is a field trip, in which case you go into the field for 4 hours from 7-11 am on Tuesday, Thursday, or Saturday (depending on your lab section). The lab exercises are meant to complement lectures, to enable you to see bird features up close, and to facilitate learning some bird identification characteristics and life history facts. You should bring any ERES handouts and your field guide to lab. Use of museum specimens is a privilege that should not be abused. Handle specimens carefully, always placing them gently on their backs so that all parts of the bird's body touch the table simultaneously.

Field—The vehicles will leave on the hour shown on the course syllabus, not 10 minutes after the hour. Attend the field session associated with your lab, unless you have some strange scheduling problem that necessitates a different arrangement and you've talked to your TA about it. Bring no visitors on the field trips, but do bring binoculars. Stay with the group so you can share your observations. Keep talking to a minimum and listen to what the instructors have to say; any observations from the field are fair game for the final lab exam.

Learning Expectations—In lecture, I expect students to be able to understand material more deeply than that required to successfully "regurgitate" facts. I lean heavily toward trying to find out whether students truly understand concepts, the reasoning behind arguments, and how researchers use the scientific method to make progress in building our understanding of the natural world. Some students mistakenly believe that they understand concepts because they have memorized every word in their notes, but the regurgitation of memorized words will not ensure a good grade on a lecture exam. The best way to find out how well you understand a topic is to explain it successfully to somebody without the use of notes.

Sometimes I present ideas that may have been subsequently debunked through ingenious research. Why not just tell you what the current thinking is, and skip the junk that's fallen by the wayside? I want you to see the flow of discovery and the process of science, which involves the development of a logical framework of hypotheses and predictions, and subsequent disproof of ideas because some facts are inconsistent with predictions. The emergence of a fact that serves to disprove an idea or the emergence of a new hypothesis that was previously overlooked but perfectly consistent with existing information is a thing of beauty...you need to develop a feeling for the **development** of concepts, not just the current thinking in a vacuum!

In lab, I expect students to glean facts related to bird morphology, anatomy, taxonomy, and natural history. In contrast with lecture, this is entirely a memorization task.

Exam style—As stated above, lab exams will involve pure memorization. If you spend a reasonable amount of time learning the material, you will get a good grade. In contrast, I will pose three classes of questions on each lecture exam. Each class or type of question is listed below, in order of increasing importance and point value:

(1) pure memorization—Did the student learn the material presented?

(2) logic—Did the student understand the significance or relevance of each bit of information?

(3) transposition—Can the student take what is known and understand the implications, or can the student represent known information graphically or symbolically?

For all three categories of questions, grammar is of utmost importance. If you write something that does not accurately (grammatically speaking) reflect what you **meant** to write, then the answer is technically incorrect. It is not that you need to write your answer using certain words, or in a certain way; it's that you need to write what you mean. Developing a clear, concise, and unambiguous form of written and verbal communication is a critically important part of your education.

Exam policy—I do not give make-up exams, so take note of the dates scheduled on the syllabus. If you see conflicts (beyond your control), tell me now. The lowest 2 scores for lab quizzes (not counting the last field quiz) will be dropped, eliminating the need for makeup quizzes.

Exam grading policy—If there is an adding error on an exam, see us immediately and we'll change the score. Otherwise, the overall quality of your test answers relative to the answers of others in the class is probably accurately reflected in the test score you receive. We always give partial credit if the possible number of points for a question is greater than one, but we also use the full range of possible points to reflect differences in the quality of answers that we read. Thus, you could receive zero points for an answer even though you wrote down some key words or phrases. For example, if a question is worth 3 points, we will probably use the points to distinguish 4 categories of answer quality. Zero points may seem harsh, but the full range of scores for a question (from full credit to no credit) is an accurate reflection of the full range of answer quality that we encountered.

Important aspects of an answer include not only whether the concept was understood, but also how well you express your understanding of a concept. We are especially interested in legibility, organization, grammar, spelling, sentence completeness, coherence, conciseness, clarity, freedom from extraneous information (information unrelated to the question), and, in some cases, the ability to express your understanding using symbolic logic (graphs and figures). Much of this is subjective, and you have to trust us to recognize and rank the quality of answers; you are paying us for our subjective opinion about your understanding of ornithology relative to others in the nation, and we believe we're doing so fairly and accurately.

Invariably, some questions will be graded a bit too harshly and others a bit too leniently. Nonetheless, if you believe that your test was graded too harshly overall, and that you should have received a greater point total, you may return the test for re-evaluation. Be warned, however...if we only re-evaluate those individual questions that you believe were graded too harshly, it would lead to an inaccurate total relative to others who choose not to contest points, and who, therefore, still retain a loss of some points due to questions that they may have had graded overly harshly. Therefore, to be fair to

those who may not wish to approach the instructors about points, and to discourage rewarding aggressive behavior for its own sake, we should review and re-grade your entire test. We will be happy to do so, if you wish. Simply note the question(s) of particular concern, and note why you feel the scoring may have been incorrect. We will review every question, with an eye toward finding errors due to both overly lenient and overly harsh grading. Point gains and/or point losses will be noted, and the new point total recorded. We will then return the re-graded test in a day or two.

Writing requirement—We are requiring that you write a proposal to conduct original ornithological research. Instructions and expectations for this assignment are appended below.

Review sessions—My view is that these generally defeat the purpose of trying to get you to view studying as an ongoing process. Students need to develop the habit of regularly reviewing lecture material, not waiting until the night before an exam to try to decipher several weeks of material. My experience is that most students traditionally use study sessions as their **only** time to really begin to think about lecture material, and that is a poor way to encourage the study habits that I want to encourage. Instead, we are all available for mini-review sessions all through the semester via office hours, during which you may wish to discuss or clarify lecture material. Collectively, there will be some 100 + hours available through the instructors and TAs. Thus, if you need help understanding the lecture material, there are plenty of "review sessions" available through office hours.

Course grading scheme—

lecture:	exam 1	100 pts	
	exam 2	100 pts	
	exam 3	100 pts	
	final exam	100 pts	
lab:	exam 1	75 pts	(evening)
	exam 2	75 pts	(evening)
	quizzes	70 pts	(drop 2 lowest, but not the last field quiz)
writing assignment:		130 pts	

Dropping, adding, changing grade option—University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in this course. These policies are described on p. 19-20 of the 2002-2003 catalog. Students should specifically note that after the 30th day of the semester (10 March 2003), such changes are NOT automatically approved. They may be requested by petition, but the petition MUST be accompanied by documentation of **extenuating circumstances**. Requests to drop a course or change the grade basis to benefit a student's grade point average will not be approved.

Ornithology 304

Class Writing Assignment
Spring Semester 2003

For your formal writing assignment in ornithology, we would like you to write a proposal for original and exciting ornithological research. You are NOT required to conduct the work that you propose.

Your proposal will be prepared as if it were to be submitted to the National Science Foundation. It will contain a *Title Page*, brief *Project Summary*, detailed *Project Description*, and a *Literature Cited* section. The *Project Description* is the key section, which consists of three subsections: *Background and Significance*, *Hypotheses and Predictions*, and *Methods*. It constitutes the bulk of a proposal. In this section, you will:

(1) define a research question, explaining why it is interesting and important and needs to be answered;

(2) provide three reasonable and possible hypotheses or answers to your question, and explain how you would discriminate among your alternative hypotheses;

(3) describe how you would collect and analyze the data necessary to discriminate among your alternative hypotheses given the time and money to do so.

You will submit each part of the *Project Description* as a separate, 3-5 page (double-spaced) paper, corresponding, respectively, to the *Background and Significance*, *Hypotheses and Predictions*, and *Methods* subsections of a National Science Foundation proposal. Each paper will be reviewed and handed back with the score that you will receive for that section if you make no further changes. You will then resubmit all three sections together as the *Project Description* in your final proposal.

Steps and Deadlines

1) Three worthy research questions (<1 page).
Due 7 February. 15 pts.

> The first step in this project is to define your question. On 7 February, you must turn in a list of three questions within the realm of ornithology that interest you and are amenable to this assignment. To work within the framework of this project, your questions must beg answers that are not simply "yes" or "no." As a rule of thumb, you'll need to pose questions that ask "how," or "what," or "why," rather than "is," or "does?" For example, “Why is clutch size smaller in the tropics than in the temperate zone?” “Why do some males of some species incubate and others not?” “Why is nest success lower in fragmented forests than intact forests?”

2) *Background and Significance* (3-4 pages, including tables and figures but not including literature cited).
Due 28 February. 34 pts.

In this first subsection of the *Project Description*, you will explain the purpose, significance, and specific objectives of the proposed research. You may begin by describing the particular pattern or phenomenon of interest, citing evidence for its existence and reporting what is presently known or presumed by various scientists about how or why it occurs (or occurred, in the case of, say, the origin of bird flight). Here you must summarize the present understanding of the topic and frame your research question within the state of our knowledge. You must convince the discerning reader that there is a pressing need to shed new light on the subject, and that you have an exciting and innovative way of doing so. You must "sell" the project to those apt to ask "So what?" or "Who cares?"

To make a compelling case that your topic needs study, you must have a fair grasp of the relevant and current scientific literature. We expect you to glean information on your topic from sources other than the class texts and will provide materials and suggestions to aid in your literature search. You must reference the sources of your information in the text and provide full citations in the *Literature Cited* section. Please refer to the handout, *Citing Literature in Scientific Papers*, for detailed instruction.

3) *Hypotheses and Predictions* (3-5 pages, including tables and figures but not literature cited).
Due 21 March. 34 pts.

In this subsection you will flesh out at least two alternative answers to your research question. Your hypotheses must be credible, and you should explain why they are good candidates to explain the pattern or phenomenon of interest with as much supporting evidence from recent ornithological or ecological literature as possible. Again, you must include references to this literature in the text and provide full citations in a *Literature Cited* section.

From each hypothesis, you must generate at least one *testable* prediction that *must* be true if the more general hypothesis is, indeed, true. The prediction(s) will tend to describe attributes or relationships that one would expect to observe under specific circumstances, given that the hypothesis from which it has been derived is generally applicable. By making a prediction that must be true for a given hypothesis to be true, you have the potential to falsify, or reject, that particular answer to your research question. If repeated studies fail to reject a particular answer, that hypothesis gains credence among scientists. Therefore, it is critical that you make specific predictions that *absolutely must be true* for your hypotheses to be true.

You should provide graphs or other illustrations of the predicted relationships or attributes, whenever possible. From these graphs, the type of data that you will need to collect to test each hypothesis will be clear, providing a nice segue into the next subsection, which will describe your research methods.

4) *Methods* (3-4 pages, including figures and tables but not literature cited).
Due 11 April. 32 pts.

This subsection should include the nuts and bolts of how the project will be implemented and evaluated. A general "who," "what," "when," "where," "how," and "why" should suffice. Focus less on the fine details of data collection and analysis and more on the rationale behind your "plan

of attack," including the overall design of experiments or other activities necessary to test your predictions. Explain how you will come up with the numbers in the previous section's graphs.

Defend your chosen methods, especially if they are novel or unorthodox. Include references to support your choices. If you propose to use animals in your research, you must specify the species, number of individuals included in the study, and justify any potential discomfort, stress, pain, or injury that the animals may experience as a result of your activities. Be sure to acknowledge any potential problems and describe alternate approaches.

5) Final proposal (11-15 pages double-spaced, not including literature cited).
Due 25 April.

Revise and combine your three papers into one *Project Description* with the subheadings *Background and Significance*, *Hypotheses and Predictions*, and *Methods*. Merge all references from each subsection into a single *Literature Cited* section. Add a *Title Page* and *Project Summary*.

The title page should contain a brief, descriptive title for the project. Give some thought to the wording. Shoot for a clever title that provides an accurate description of the project and has some "advertising" benefits as well. Include your name and the name of your department and university along with the date of submission.

The project summary should be no more than one page in length (double-spaced). According to NSF, *It should not be an abstract of the proposal, but rather a self-contained description of the activity that would result if the proposal were funded. The summary should be written in the third person and include a statement of objectives and methods to be employed. It must clearly address in separate statements (within the one-page summary): (1) the intellectual merit of the proposed activity; and (2) the broader impacts resulting from the proposed activity. It should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader.*

In summary: Final proposal = *Title Page* + *Project Summary* + *Project Description* + *Literature Cited*. Submit the final manuscript double-spaced, with 1" margins, and no smaller than 11-point type. Do not exceed 15 pages, excluding the *Literature Cited* section, which can be as long as necessary.

We will rescore the *Background and Significance*, *Hypotheses and Predictions*, and *Methods* sections based on your revisions. You will receive an additional maximum of 15 points for the *Title Page* and *Project Summary*.