

Animal Behavior

Biology 480 (3 credits)
New Mexico State University, Spring 2019

Instructor: Dr. Timothy Wright
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Class Meetings: Lectures Monday, Wednesday, 8:30-9:20
Discussion Friday, 8:30-9:20
Foster Hall 146 Domenici Hall 223

Office Hours: Tuesday 1:15-3:00 in Foster 310 or by appointment

Course overview and objectives: Animal behavior is the study of what animals do. We will explore behavior by asking both *how* animals do things (a mechanistic perspective), and *why* animals do these things (an evolutionary perspective), and examine how behavioral biologists integrate these two perspectives to develop a more complete understanding of behavioral processes. Topics to be covered include: the evolution of behavior, neuroendocrine mechanisms of behavior, behavioral genetics, behavioral development, behaviors that help animals stay alive (finding a place to live, foraging, anti-predator behavior), behavioral interactions between individuals (reproduction, mating systems, parental care, communication, conflict, cooperation, and altruism), and applications of these topics to conservation biology and other applied fields. We will explore these topics through lectures, discussion of papers from the primary literature, and a written research proposal assignment.

By the end of this course you will have developed a solid understanding of the integrative field of animal behavior, as manifested by the ability to:

- 1) distinguish between proximate mechanisms and ultimate causation,
- 2) engage in the scientific process as applied to animal behavior.
- 3) interpret and produce graphical representations of data.
- 4) describe general patterns of animal behavior across a wide range of contexts

This course is intended for majors in Biology, Psychology, Wildlife Science, Conservation Ecology, Anthropology and related fields.

Prerequisite courses: Successful completion of BIOL 111G (Natural History of Life) and junior (or above) standing is required. Successful completion of BIOL 211G (Cellular and Organismal Biology) and BIOL 322 (Zoology) is recommended.

Text: The required text is *Animal Behavior: Concepts, Methods and Applications*, 2ed by Shawn Nordell and Thomas Valone (Oxford, ISBN 978-0-19-973759-8). The cover features a basilisk lizard running across water. Books are available for purchase at the campus bookstore and elsewhere. The book will be an important resource for you, so you should ensure you have regular access to it.

Course Webpage: The course web page is available in Canvas. General course information, lecture handouts, PDF files of discussion papers and grades will be posted on this site. It is also the preferred route for e-mailing me.

Class Format: We will have lectures on Monday and Wednesday and discussions on Friday each week. The discussion section will devoted to student-led discussion of a research paper drawn from the current literature. Questions and general discussion are highly encouraged throughout the lectures. Powerpoint lecture notes will be posted by 5 pm on the evening prior to lectures. You are encouraged to print these out handout format in advance to aid in note taking. Be aware, however, that these outlines will not be identical to the slides presented in class; considerable information will be left out in order to encourage active note taking, independent thought and interaction during lectures. **The posted lecture outlines are not a substitute for attending lecture and taking your own notes!**

Use of Electronics: Laptops and notepads are permitted for taking notes and viewing course materials as long as they do not present a distraction to you and other members of the class. The instructor reserves the right to disallow their use if this expectation is abused. Cell phones should be turned off during class. Electronic conversations and text messages should be conducted outside of class time. Use of ALL electronic devices is explicitly forbidden during exams without the express permission of the instructor; violation of this policy may result in a grade of zero for that exam.

Paper Discussion: Each discussion will be led by a student and will focus on one research paper from the primary literature in the field of animal behavior. The class schedule below lists the papers chosen from by the instructor from the current literature to complement the lecture topics for that week. These are available as PDF files on the course Canvas site.

The goals of these weekly discussions are two-fold: first, to improve your ability to think critically, and second, to give you a sense of animal behavior as an active field of scientific research. In order to meet these goals, each student must **carefully read** the assigned paper each week and should **prepare at least two questions** or substantive comment (positive or negative) about the assigned paper. Some questions you should ask as you read papers are: What is the paper's primary objective? Does it attempt to test a specific hypothesis? Does this hypothesis make sense in terms of what is already known about this area of animal behavior? Are the methods appropriate to address the question? If the methods are observational, are they free from bias? If experimental, are they properly designed and controlled? How are the data analyzed? What are the main results, and how do the authors interpret them? Do the conclusions follow logically from the data? Do the data support their hypotheses? Have they considered alternative explanations? How do these results compare with previous work in the area? Do they advance our understanding of this field of research? What further work might be interesting to conduct given these results? The questions should be **typed on a piece of paper in advance of coming to class**; I will collect them in some discussions to verify that you have prepared adequately for the discussion. If you are prepared for discussion and share your thoughts and comments on these areas with the class at an appropriate point in the discussion then you will receive full points for participating in discussion that day. If you have not read the paper or are not prepared for the discussion you will not receive full participation points.

When it is your turn to lead, you will be responsible for presenting a brief (5 minute) summary of the paper that gives some background information on the study system and questions addressed in the paper. You will then be responsible for leading a general discussion of the methods, results and conclusions of the paper. Here your job is not only to understand the

research, but also to pick out its strengths and weakness and evaluate its importance in the field. To do this you will need to draw on what you have learned in the class and avoid the pitfall of being intimidated by statistics and scientific jargon. You **MUST** avoid lecturing to the class for the entire discussion period, as the goal is to have an inclusive discussion in which everyone has a chance to participate. This will be a challenge in the brief 25 min periods we have for each discussion, so you **must be prepared** when you walk in the door. The liveliest discussion result when the presenter is prepared with a **list of questions** for the class that either help it work through the paper systematically or help it to identify major weaknesses or strengths. I will be available during office hours or by appointment to help presenters prepare when it is their turn to lead; I **strongly encourage** presenters to visit me during office hours (Tues 1:15-3:00) before it is your turn to present so you can make sure you understand the paper and are preparing appropriately.

Your performance in discussion sections will be worth 200 points towards your final grade (100 points for overall participation, 75 points for leading the discussion).

Written Research Proposal: Each student will be responsible for writing a research project proposal in the general style of a student grant proposal for the Animal Behavior Society <http://www.animalbehaviorsociety.org/web/awards-student-grants.php>. The goal of such proposals is to convince the reader that you have found a topic of general interest, are conversant with previous research on this topic, have enunciated a specific question or hypothesis that should be tested to shed new light on the general problem, have a suitable species and feasible plan to collect relevant data, and a clear explanation of how the data will test your hypotheses and advance the field. In the real world the overall goal is to convince the reviewer that they should give you some money, usually from very limited funds, to do this project. In the context of the class your goal is to excite your instructor enough about your proposed work that he gives you a good grade.

Although the ABS website listed above gives useful general guidelines on how to write a successful grant proposal, you should follow the specific guidelines below for your proposal assignment.

1) **General guidelines:** The proposal should be no more than 4 pages in length with 1 inch margins, 11 or 12 point font, single spaced lines and spaces between paragraphs. Proposals should have a title and your name and the date on the top of the first page.

2) **Proposal Sections:** It should contain the following sections.

- **Summary or Abstract:** A single paragraph that summarizes the broad question, the specific hypothesis, the proposed methods, the expected outcomes and general significance.
- **Introduction and Background.** This section should be ~4 paragraphs long. The first should describe the general behavior question you are asking and why it is important. The second and third should summarize what is known about this phenomenon from previous work, relying heavily on citations of primary literature. This part can also discuss what is NOT known-- what are outstanding questions or areas of uncertainty in the field? The next paragraph should briefly describe your proposed study system and methodological approach and why they are well suited to address these outstanding questions. Include citations to the relevant literature throughout the introduction.

- **Specific Hypothesis:** This brief paragraph should clearly state the question you propose to answer or hypothesis you are testing. You should state both the explicit hypothesis you are testing and the predictions it will make for the data you will collect (e.g. what different patterns in the data will tell you about the hypothesis).
- **Methods:** A detailed section of several paragraphs describing how you plan to collect the data. It should include a specific sampling plan including the frequency and timing of data collection and the number of animals sampled. You should be realistic in your plan: it should be achievable by one person (perhaps with 1 or 2 assistants if necessary) working full time for the amount of time you specify. It should also include a section on animal care and how you have addressed the ethical imperative to minimize distress and suffering in animals used for research. This section should also contain citations to the relevant papers that have used similar approaches.
- **Predicted Outcomes:** This section should discuss what patterns you might expect in your data and how these will support or not support your hypotheses. It should include two sample graphs of simulated data; one showing a pattern that would support your hypothesis and one that would not support your hypothesis. These data **will not be real** because you are not actually performing the proposed experiments, but they **should be realistic** in the sense that they are what might be expected given the species and methods you are using. These graphs can be made in any graphing software or even (very) carefully drawn by hand. Make sure to include a figure legend explaining the graphs and label all axes as found in papers in *Animal Behaviour*.
- **Significance of the Research:** This brief section should summarize the importance of the proposed research: how will the information be useful to the field of animal behavior and society in general?
- **Bibliography:** It should include a bibliography of 12-15 papers from the primary scientific literature. This bibliography does NOT count as part of the 4 page limit for your proposal. These papers may be drawn from the discussion papers or others that you find in the literature. All papers in the bibliography need to be cited in the main text; citations and the bibliography entries should be in the reference style used by the journal *Animal Behaviour* (<https://www.elsevier.com/journals/animal-behaviour/0003-3472/guide-for-authors#85001>).
- **Sections not required:** Unlike a typical ABS student grant, you should NOT provide a budget or curriculum vitae. These will not be graded if included.

3) **Individual meetings:** To help guide you in the formulation of your proposal, all students will meet individually with the instructor **either during class on 4/5 or during special office hours from 1:30-3:30 on 4/4**. Students should come prepared with 2 or 3 potential research topics to discuss with the instructor. Students should have done some background reading on each so they can justify them as suitable research topics. The NMSU library website for finding articles in Biology is the best place to start (<http://nmsu.libguides.com/az.php?s=42449>). I strongly recommend the *Web of Science* search engine as it allows you to search on keywords and also shows other papers that have cited papers of interest—these will often also be useful for you. *Google Scholar* is also useful, but does not always do a good job of identifying all the scientific literature in an area. Webpages generally are not appropriate as scientific citations and will not count towards your citation tally.

4) **Preliminary Bibliography:** We will have a second series of individual meetings in **class on 4/22 or during office hours from 1-3 on 4/23** to discuss progress on the research proposal. At that meeting each student will turn in a Preliminary Bibliography of 8 references from the primary literature. Citations should be printed as a hard copy in the style of *Animal Behaviour*.

Research proposals will be worth 200 points towards your final grade (150 points for the project proposal, 25 points for the Preliminary Bibliography, and 25 points for adequate preparation for the individual meetings with the instructor).

Exams: There will be three midterm exams and a final. Midterm exams will be given during the class periods on **Monday 2/11, Wednesday 3/13 and Wednesday 4/17**. Midterms will each be worth 125 points. The final exam will be given during exam week during the scheduled exam period, **Wednesday 5/8 from 8-10 am**. Half the final exam will cover class material for the last 1/3 of the course and half will cover material from the entire course (i.e. will be cumulative and comprehensive). The final will be worth 250 points.

Exam format will be short essay questions and will include problem-solving, data interpretation and discussion. They will cover material presented in lectures, the textbook and the discussion papers as detailed in the class schedule, and any other sources designated by the instructor. Exams will be designed to encourage integration of information from these sources. **All answers given on exams must be in your own words** and no written materials are allowed in the exam room.

Students who will miss an exam **on documented university business** must provide the written documentation to Dr. Wright **two weeks in advance of the exam** and must make arrangements with him to take the exam early (i.e. before leaving on university business). Failure to follow this procedure will result in the student obtaining a zero for that exam. If a **serious and unavoidable medical or family emergency** causes you to miss an exam you must provide verifiable written documentation of the emergency to the instructor. If this documentation is judged acceptable then you may make take a make-up exam, which may either be a written or an oral exam at the discretion of the instructor. If you do not take an exam and do not contact me, or your reason for missing the exam is not judged to be serious, unavoidable and verifiable, you will receive a zero for the exam and your course grade will be calculated accordingly.

Academic Honor: Academic honesty is a fundamental expectation of your participation in this course and your academic life at New Mexico State University. **Academic misconduct will not be tolerated in this class and any cases of academic misconduct will be prosecuted fully following NMSU procedures.**

The Student Code of Conduct defines academic misconduct, non-academic misconduct and the consequences or penalties for each. The Student Code of Conduct is available in the NMSU Student Handbook online: <http://studenthandbook.nmsu.edu/>. Academic misconduct is explained here: <http://studenthandbook.nmsu.edu/student-code-of-conduct/academic-misconduct/>. Academic misconduct includes, but is not limited to possession and/or use of unauthorized materials during exams; copying the work of another (e.g. another student, instructor or other reference source); using the words or ideas of another (e.g. another student, instructor or other reference source), especially without proper acknowledgement and citation (but keep in mind that citing a source DOES NOT allow you to use their words and/or organization and/or structure if these are copied directly or substantially copied); providing another student the

opportunity to copy your work on exams or assignment, looking at the work of another student during exams and providing another student the opportunity to earn participation points when they are not in class to earn them themselves.

Students must be especially careful to avoid plagiarism, particularly when writing the research proposals. Plagiarism is defined as the presentation of others' ideas as your own, whether intentional or not. Any ideas or materials taken from another source must be fully acknowledged. Not only must you credit your source(s) for any ideas that are not your own, but you **MUST** paraphrase in **YOUR OWN WORDS**, or use quotation marks to indicate a direct quotation. The NMSU Library has more information and help on how to avoid plagiarism at <http://lib.nmsu.edu/plagiarism/>. If you submit an assignment in which you have merely changed a few words from a source, or have retained the structure and organization of your source, then you have submitted a plagiarized assignment, even if you have cited that source. Any act of plagiarism will result in a **MINIMUM** of a zero for that assignment, and more severe penalties (including failure of the course) may be imposed at the discretion of the instructor.

Withdrawals: It is the responsibility of the student to administratively withdraw from the class should you decide to do so. **The deadline to drop without a 'W' is Friday 2/1, the deadline to drop with a 'W' is Friday 3/15.**

Attendance: Lecture attendance is expected except for documented university business or extreme emergencies, and regular participation will greatly improve your success in the course. You will be graded on your active participation in discussion sections as detailed above.

Grading Summary: The final grade will be determined by the points accumulated on each part of the course. The different parts are valued as follows:

Discussions	175 (100 for participation, 75 for leading)
Midterm Exams	375 (3 exams, 125 points each)
Final Exam	250 (125 points for last 1/4 coverage, 125 for comprehensive)
Research Proposal	<u>200</u>
Total	1000

I will assign grades for points earned during the class according to the following scale:

A	900 and above
B	800-899 points,
C	700-799 points
D	600-699 points
F	599 and below

Disabilities and Accommodations: Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act (ADA) covers issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact: Student Accessibility Services (SAS), Corbett Center Student Union Room 208; Trudy Luken, Director; 575-646-6840; sas@nmsu.edu

Discrimination: New Mexico State University, in compliance with applicable laws and in furtherance of its commitment to fostering an environment that welcomes and embraces diversity, does not discriminate on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex

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(including pregnancy), sexual orientation, spousal affiliation, or protected veteran status in its programs and activities, including employment, admissions, and educational programs and activities. Inquiries may be directed to the Laura Castille, Executive Director, Title IX and Section 504 Coordinator, Office of Institutional Equity, P.O. Box 30001, E. 1130 University Avenue, Las Cruces, NM 88003; 575.646.3635; 575-646-7802 (TTY); email equity@nmsu.edu.

Title IX prohibits sex harassment, sexual assault, intimate partner violence, stalking and retaliation. For more information on discrimination or Title IX, or to file a complaint contact: Laura Castille, Executive Director and Title IX Coordinator; Office of Institutional Equity (OIE) - O'Loughlin House; 1130 University Avenue; (575) 646-3635; equity@nmsu.edu; <http://equity.nmsu.edu/>

Other NMSU Resources:

NMSU Police Department: (575) 646-3311 www.nmsupolice.com
 NMSU Police Victim Services: (575) 646-3424
 NMSU Counseling Center: (575) 646-2731
 NMSU Dean of Students: (575) 646-1722
 For Any On-campus Emergencies: 911

Lecture Schedule (subject to revision by instructor)

Date	Day	Lecture or Disc	Topic	Textbook Chap
1/16	W	1	Intro to Animal Behavior	1
1/18	F	2	Methods for studying behavior	2
1/21	M		<i>Martin Luther King Jr. Holiday</i>	
1/23	W	3	Evolution I	3
1/25	F	4	Evolution II	3
1/28	M	5	Behavioral genetics I	4
1/30	W	6	Behavioral genetics II	4
2/1	F	D1	St. John, M. E., et al. (2019). The behavioral origins of novelty: did increased aggression lead to scale-eating in pupfishes? <i>Behav Ecol</i> , 196-196.	
2/4	M	7	Neural and hormonal mechanisms	TBA
2/6	W	8	Sensory systems I	5
2/8	F	D2	Crocker-Buta, S. P., & Leary, C. J. (2018). Hormonal and social correlates of courtship signal quality and behaviour in male green treefrogs. <i>Anim Behav</i> , 146, 13-22.	
2/11	M	Midterm I: Covers Lectures 1-7, Discussions D1-D2, and associated readings		
2/13	W	9	Sensory systems II	5
2/15	F	D3	Schraft, H. A., & Clark, R. W. (2019). Sensory basis of navigation in snakes: the relative importance of eyes and pit organs. <i>Anim Behav</i> , 147, 77-82.	
2/18	M	10	Learning and neuroethology	7
2/20	W	11	Learning and cognition	7
2/22	F	D4	Tibbetts, E. A., et al. (2019). The development and evolution of specialized face learning in paper wasps. <i>Anim Behav</i> , 147, 1-7.	
2/25	M	12	Communication I	6
2/27	W	13	Communication II	6

3/1	F	D5	Weissman, Y. A., et al. (2018). Acoustic stability in hyrax snorts: vocal tightrope-walkers or wrathful verbal assailants? <i>Behav Ecol</i> , ary141-ary141.	
3/4	M	14	Foraging I	8
3/6	W	15	Foraging II	8
3/8	F	D6	Al Shareefi, E., & Cotter, S. C. (2018). The nutritional ecology of maturation in a carnivorous insect. <i>Behav Ecol</i> , ary142-ary142.	
3/11	M	16	Antipredator behavior	9
3/13	W	Midterm II: Covers Lectures 8-15, Discussions D3-D6, and associated readings		
3/15	F	D7	Andriolli, F. S., et al. (2019). Do zombie ant fungi turn their hosts into light seekers? <i>Behav Ecol</i> , ary198-ary198.	
3/18	M	17	Migration	10
3/20	W	18	Dispersal	10
3/22	F	D8	Day, C. C., et al. (2019). Temporal plasticity in habitat selection criteria explains patterns of animal dispersal. <i>Behav Ecol</i> , ary193-ary193.	
3/25-29	Spring Break			
4/1	M	19	Habitat selection	11
4/3	W	20	Territoriality and aggression	11
4/5	F	Individual meetings with instructor during class or office hours to discuss proposal topics		
4/8	M	21	Sexual selection and mate choice I	
4/10	W	22	Sexual selection and mate choice II	12
4/12	F	D9	Lüdtke, D. U., & Foerster, K. (2018). Choosy males court both large, colourful females and less colourful but responsive females for longer. <i>Anim Behav</i> , 146, 1-11.	
4/15	M	23	Mating systems	13
4/17	W	Midterm III: Covers Lectures 16-22, Discussions D7-D9, and associated readings		
4/19	F	Spring Holiday		
4/22	M	Meetings with instructor during class or office hours to discuss proposal progress Preliminary bibliography due at meeting		
4/24	W	24	Parental care	14
4/26	F	D10	Ng, C. S., et al. (2019). Chestnut-collared longspurs reduce parental care in the presence of conventional oil and gas development and roads. <i>Anim Behav</i> , 148, 71-80.	
4/29	M	25	Parental care/Social behavior	14,15
5/1	W	26	Social behavior Grant Proposals due at beginning of class	15
5/3	F	D11	Border, S. E., et al. (2019). Social rank, color morph, and social network metrics predict oxidative stress in a cichlid fish. <i>Behav Ecol</i> , ary189-ary189.	
5/8	M	Final Exam: Wednesday 5/8, 8-10 am in FH 146 1 st half covers Lectures 23-27, Discussions D10-D11, and associated readings 2 nd half is cumulative over entire course		