

# Design of Natural Resource Studies

## ENR 8375 – Fisheries and Wildlife Seminar (3 Credits)

### Autumn 2021

**Meeting Time:** Tuesday 9:10–12:10; Kottman 333

**Instructor:** Dr. William Peterman,  
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Office Hours: Stop by whenever

#### Course Description

This will be a discussion-driven course revolving around primary literature and book chapters, as well as study design proposals and presentations prepared by each student. The course is meant to be practical in that students can use this opportunity to develop or flesh out the design of a study relevant to their graduate research. Emphasis will be placed on understanding different types of study designs, critical considerations when designing studies, and appropriate analytical approaches and inferential frameworks.

#### Course Objectives

The intent of this course is to teach beginning graduate students the principles of natural resource study design in the context of wildlife, conservation, ecological, behavioral, and evolutionary research. The ultimate goal is to effectively integrate the processes of developing research questions and hypotheses with the physical layout of field studies or experiments, and to understand the assumptions of inferential statistics.

#### Prerequisites

None

#### Grading & Attendance

There are a total of **100 points** that can be earned in this course. Grades will be assigned based on participation in discussions (**20 points**), leading discussion of assigned literature (**20 points**), writing of a research design proposal (**20 points**), peer review of proposals (**20 points**), and presentation of a research design proposal (**20 points**). Student success in this course is tied to regular attendance. Your participation grade will be reduced **5%** for each unexcused absence. Absences can be excused with communication and documentation related to the absence.

**\*Late assignments will be issued a 5% percent penalty for every 24 hours late, including weekends\***

**Communication/documentation of extenuating circumstances will remove this penalty**

A 93–100%  
A– 90–92  
B+ 87–89  
B 83–86

B– 80–82  
C+ 77–79  
C 73–76  
C– 70–72

D+ 67–69  
D 60–66  
E < 60

## Readings

All readings will be made available on Carmen, and will consist of articles from the primary literature and chapters from:

*Wildlife Study Design, 2nd Ed. (2008)* Morrison, M.L. Block, W.M., Strickland, M.D., Collier, B.A., Peterson, M.J.

*Community Ecology (1986)* edited by Ted Case and Jared Diamond (1986).

## Personal Electronics

Please be respectful of others and restrict use of personal electronic devices (phones, tablets, etc.) to necessary classroom activities.

## Take care of yourself

A recent American College Health Survey found stress, sleep problems, anxiety, depression, interpersonal concerns, death of a significant other, and alcohol use among the top ten health impediments to academic performance. Students experiencing personal problems or situational crises during the semester are encouraged to contact the OSU Counseling and Consultation Services (614-292-5766; [www.ccs.osu.edu](http://www.ccs.osu.edu)) for assistance, support, and advocacy. **This service is free and confidential**

**Academic misconduct** will not be tolerated in this course. The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct (<http://studentaffairs.osu.edu/csc/>) and, specifically, the sections dealing with academic misconduct. I am obligated by University Rules to report suspected academic misconduct in the course. Please see the Student Resource Guide if you have questions about this policy and as always please contact me if you have any questions.

## Writing Assistance

Writing is a critical form of communication, and effective writing takes time, effort, and practice. The Center for the Study and Teaching of Writing (<http://cstw.osu.edu/writing-center>) offers "offers free help with writing at any stage of the writing process for any member of the university community. During our sessions, consultants can work with you on anything from research papers to lab reports, from dissertations to résumés, from proposals to application materials." Please take advantage of this resource to submit the best possible writing assignments in this course.

**Special Needs:** If you need an accommodation based on the impact of a disability, please contact me to discuss as soon as possible. We can discuss the course format, anticipate your needs and explore potential accommodations. I rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not previously contacted the Office for Disability Services, I encourage you to do so (<http://www.ods.ohio-state.edu>, Phone: 614-292-3307)

<b>Week</b>	<b>Topic &amp; Reading(s)</b>	<b>Leader</b>
1	<b>Eco-Evo Blog post:</b> <a href="http://tinyurl.com/Eco-EvoBlog2017">http://tinyurl.com/Eco-EvoBlog2017</a>	
2	<b><u>Philosophy of Science / Types of Study</u></b> Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 1</b>	
	Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 2</b>	
	Romesburg, H.C. 1981. Wildlife science: Gaining reliable knowledge	
3	<b><u>Experimental Design</u></b> Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 3</b>	
	Diamond, J., 1986. Overview: laboratory experiments, field experiments, and natural experiments. <i>Community ecology</i> , pp.3-22.	
	Shaffer, T. L., and D. H. Johnson. 2008. Ways of learning: Observational studies versus experiments. <i>The Journal of Wildlife Management</i> 72:4–13.	
4	<b><u>Pseudoreplication</u></b> Davies, G. M., and A. Gray. 2015. Don't let spurious accusations of pseudoreplication limit our ability to learn from natural experiments (and other messy kinds of ecological monitoring). <i>Ecology and Evolution</i> 5:5295–5304.	
	Hurlbert, S. H. 1984. Pseudoreplication and the design of ecological field experiments. <i>Ecological Monographs</i> 54:187–211.	
	Oksanen, L. 2001. Logic of experiments in ecology: Is pseudoreplication a pseudoissue? <i>Oikos</i> 94:27–38.	
5	<b><u>Survey Strategies</u></b> Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 4</b>	
6	<b><u>Sampling Strategies / Impact Assessment</u></b> Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 5</b>	
	Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 6</b>	
7	<b><u>Inventory &amp; Monitoring / Design Applications</u></b> Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 7</b>	
	Morrison, M.L.et. al. 2008. <i>Wildlife study design</i> . <b>Chapter 8</b>	
8	<b><i>NO CLASS – Wildlife Society Meeting</i></b>	
9	<b><u>Hypothesis Testing &amp; Inference</u></b> Quinn, J. F., and A. E. Dunham. 1983. On hypothesis testing in ecology and evolution. <i>The American Naturalist</i> 122:602–617.	
	Blog Post: <a href="https://tinyurl.com/multicausality">https://tinyurl.com/multicausality</a>	
10	<b><u>Model Selection &amp; Competing Hypotheses</u></b> Betini, G. S., T. Avgar, and J. M. Fryxell. 2017. Why are we not evaluating multiple competing hypotheses in ecology and evolution? <i>Royal Society Open Science</i> 4.	
	Burnham, K. P., D. R. Anderson, and K. P. Huyvaert. 2011. AIC model selection and multimodel inference in behavioral ecology: some background, observations, and comparisons. <i>Behavioral Ecology and Sociobiology</i> 65:23–35.	
11	<b><u>Scale</u></b> Wiens, J. A. 1989. Spatial scaling in ecology. <i>Functional Ecology</i> 3:385–397.	
	Schindler, D. W. 1998. Whole-ecosystem experiments: Replication versus realism: The need for ecosystem-scale experiments. <i>Ecosystems</i> 1:323–334.	
12	<b><u>Analytical Frameworks</u></b> Bolker, B. M., M. E. Brooks, C. J. Clark, S. W. Geange, J. R. Poulsen, M. H. H. Stevens, and J.-S. S. White. 2009. Generalized linear mixed models: a practical guide for ecology and evolution. <i>Trends Ecol Evol</i> 24:127–135.	
	Ellison, A. M. 2004. Bayesian inference in ecology. <i>Ecology Letters</i> 7:509–520.	
	Grace, J. B. 2008. Structural equation modeling for observational studies. <i>Journal of Wildlife</i>	

	Management 72:14–22.	
13	<b><u>Interpreting / Reporting Statistics</u></b> Møller, A., and M. D. Jennions. 2002. How much variance can be explained by ecologists and evolutionary biologists? <i>Oecologia</i> 132:492–500.	
	Nakagawa, S., and I. C. Cuthill. 2007. Effect size, confidence interval and statistical significance: a practical guide for biologists. <i>Biological Reviews</i> 82:591–605.	
	Colegrave, N., and G. D. Ruxton. 2003. Confidence intervals are a more useful complement to nonsignificant tests than are power calculations. <i>Behavioral Ecology</i> 14:446–447.	
14	<b><i>NO CLASS – Thanksgiving Break</i></b>	
15	Proposal Presentations	
16	Proposal Presentations	

## Assignments

**Research proposal (20 points)** – You will write a research proposal on a topic or project of interest. It should be of practical benefit for you and your research, regardless of where you are in your career. This is not intended to be a full-blown proposal. Much less time and effort will be spent on background, justification, and implications. These are obviously critical, but are not the focus of this exercise. Emphasis will be placed on clearly aligning your study design with your stated goals, objectives, and hypotheses, as well as proposed analyses.

- Initial draft due Week 12
- Final proposal due Week 16

**Peer Review (20 points)** – You will provide critical review of a peer’s research proposal. We will discuss the anatomy and expectations of a quality peer review, and your review will be evaluated in light of these.

- Reviews will be due Week 13

**Presentation (20 points)** – You will give a ~12 minute presentation, followed by a ~12 minute class discussion. Presentations need to detail the objectives, hypotheses, and analyses being proposed. Emphasis will be placed on developing meaningful visual displays of your study design and hypotheses.

- Presentations will occur during Weeks 15 & 16

**Presentation (20 points)** – Each week you are expected to be an active and engaged participant in the discussion of assigned readings.

**Communication** – I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.
- **E-mail:** I will reply to e-mails within **24 hours on school days**.