

WIS 5496: Research Design in Wildlife Ecology and Conservation

COURSE DESCRIPTION - General

INSTRUCTOR:	DR. KATIE SIEVING, OFFICE = ROOM 320 NEWINS-ZIEGLER HALL
CONTACTS:	PHONE 846-0569, EMAIL: CHUCAO@UFL.EDU
OFFICE HOURS:	3 HOURS PER WEEK TBA (in person or zoom)
CLASS MEETINGS:	TWO 2-HOUR DISCUSSION SESSIONS PER WEEK, IN PERSON (USUALLY T AND TH)
WEBSITE:	E-LEARNING IN CANVAS HTTPS://LSS.AT.UFL.EDU/

OVERVIEW AND COURSE GOALS

WIS 5496 is for graduate students studying ecological disciplines related to conservation in the developmental phase of their research. This course begins with the logic and philosophy underlying scientific testing, and proceeds to the organization of rigorous research and sampling designs. This is **not a statistics or methods** class. You **will not** crunch numbers or collect data, but you **will** organize your thesis / dissertation research and complete a winning research proposal you can use for committee meetings and funding applications.

COURSE MODULES

MODULE I. THE BASICS OF SCIENCE PHILOSOPHY FOR ECOLOGISTS

What knowledge does society ask of scientists like you? We will examine key historical themes defining current approaches in ecology. In this module, we highlight the role of **theory** in guiding application; how theories are constructed and evolve. We discuss the central roles of major **testing criteria** (falsification, confirmation) applied within the flexible framework of **hypothetical deduction** and common **modes** of testing (verification, manipulation, comparison, correlation) and their relationships to **types of inference** in creating new, reliable, useful knowledge about how things work in nature.

MODULE II. RESEARCH DESIGN: STRATEGY, LOGIC, AND ORGANIZATION OF YOUR RESEARCH

Here we construct the foundations of logic and testing strategies in your research. How exactly do you state your objectives, hypotheses, critical tests, and predictions? How do you ID key assumptions you are making and how do you cope with alternative/confounding factors? You need to know:

(1) What is your study domain / system? (2) What type of inferential power is required (causal, predictive, descriptive, or explanatory) to solve the problem you take on? (3) What constrains your needs for internal versus external validity? (4) How do you express your design using the language of science?

You will learn how to integrate various designs [descriptive, case-control, comparative, (quasi-) experimental, modeling, meta-analysis, et al.] as needed to achieve your goals.

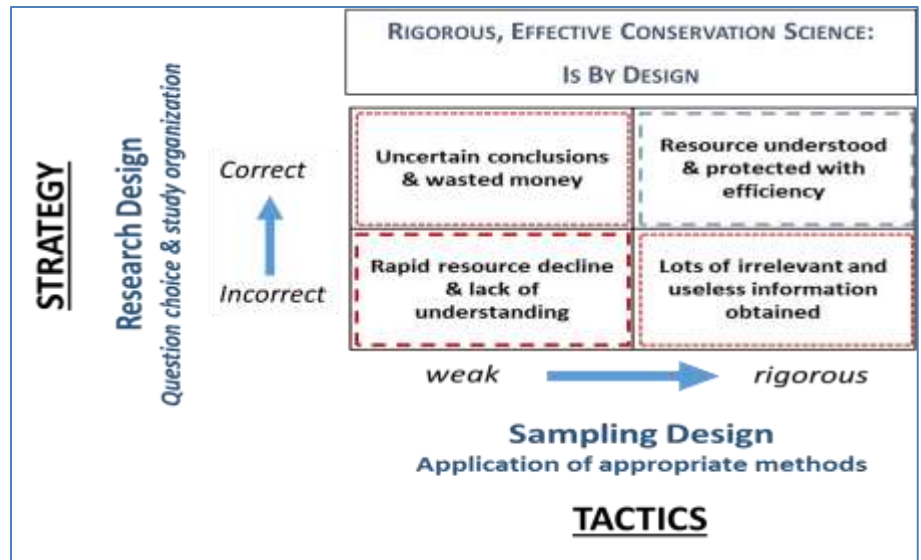
MODULE III: SAMPLING DESIGN: TACTICAL REALIZATION OF QUANTITATIVE RIGOR.

You may have the perfect research **design strategy** for your question, but if you do not sample correctly, then you fail (Fig. 1). **Sampling design** defines the **tactics** of research. Together, **research** and **sampling design** (**strategy** and **tactics**) determine success, along with **quantitative rigor** (**precision** and **accuracy**) of knowledge obtained. We establish the principles / steps in creating a rigorous sampling design, including power analysis. We prepare you to make an accurate choice of statistical analysis approach by laying out your variable structure (predictors, responses, their measures and predicted relationships). We discuss the concept and tactics of **ethical rationality** in the field of conservation ecology (as it influences sampling and analysis). If time allows, we will compare and contrast data analysis philosophies.

Figure 1. In sum:

This class will give you **confidence** to conduct

- the **RIGHT** study
 - for the **RIGHT** reasons;
- = Strategy**
- and to do it **WELL**;
- = Tactics**



Your thesis work needs to be in the top right quadrant to be publishable and useful.

Specific Learning Objectives: You will understand..

1. essential science philosophy/history; how “new” pluralism unites & invigorates natural science;
2. the structure, dynamics and utility for you of ecological theories, paradigms, and theory frameworks;
3. how hypothetical-deduction is a foundational logic of rigorous science;
4. how to apply different testing criteria, testing modes, and a full toolbox of research design groups;
5. best practices in sampling design, and how to deal effectively with sampling constraints;
6. how conservation objectives and ethics can influence study design, analysis, and interpretation of data;
7. how to organize and write an effective research proposal for different funding sources.

Required Texts:

Pickett, Kolasa, and Jones. 2007. Ecological understanding: the nature of theory, and the theory of nature. 2nd Edition. Academic Press. Other readings will be posted.

Grading:	Participation (attendance, preparation)	100
	3 exams (100 pts each)	300
	Final Proposal	100
	Proposal Peer Review	100
	Homework (timely, effort; 10 x 20pts)	200
	Total	800 points

Course grade will be determined on a percentage accumulation of total points (94% or more = A; 90-93% = A-; B+ = 87-89%; B = 84-86%; B- = 80-83%; C+ = 77-79%; C = 74-76%; etc.), unless application of a curve becomes necessary. UF grading policy: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Grading Philosophy: I will not be grading your research topic or choice of research approach in this class.

I grade on effort (assignments/homework), participation, preparation, & presentation of your research.

- Hard work in my class will directly benefit your research and your development as a skilled scientist.

Participation Points & absences:

Complete your written homework and paper assignments on time! Late HW will lose points (5) each week they are late. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. See <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Prepare for discussions in class:

I may assign students to lead discussions of assigned readings. Be prepared to lead (and contribute to) lively and thorough discussions that highlight understanding of the key concepts for each reading.

Keep a reading journal:

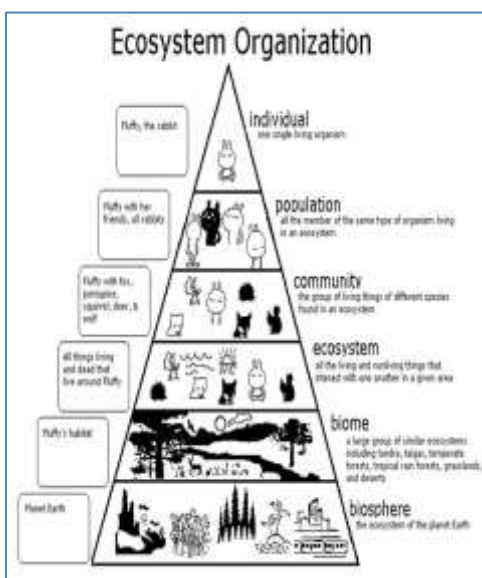
It is the best way to prepare for discussions of readings! For each assigned reading, we will list the key concepts to know – write explanations of these concepts based on readings and then address any questions you have in class during discussions. Writing improves learning.

Be professional in your peer reviews of others' work:

You will be required to critique (not edit) drafts of others' research proposals. Follow guidelines and give these reviews your best effort. Your reviews get graded – not the drafts!

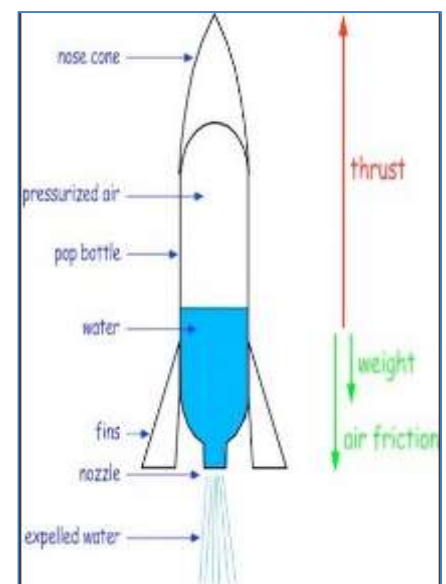
Ecosystems have characteristics that make ecology a complex field of study.

- Ecosystems are (1) historical (they accumulate change), (2) multi-causal, (3) probabilistic, (4) they evolve and because humans are part of them, they are (5) reflexive (they (essentially) learn new patterns).
- We need to understand ecosystems, but also seek to sustain them. Therefore, conservation ecology (done well) demands sophisticated understanding of how ecosystems work, what is happening to them, and why and how knowledge is needed to bring about effective protection, restoration, management, and prediction under uncertainty.
- This is the focus of this course.



← Ecology Rocket Science →

ECOLOGY CERTAINLY IS NOT 'ROCKET SCIENCE' – IT'S A LOT HARDER!



UF Academic Honesty and UF Honor Code: “UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.”

UF Campus Resources:

- *U Matter, We Care:* If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
- *Counseling and Wellness Center:* <https://counseling.ufl.edu/>, 392-1575.
- *University Police Department:* 392-1111 or 9-1-1 for emergencies. <http://www.police.ufl.edu/>
- *Sexual Assault Recovery Services (SARS):* Student Health Care Center, 392-1161.
- *E-learning technical support,* 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.
- *Career Connections Center,* Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>
- *Library Support,* <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

UF Computer Software Usage: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for individual violators. As such violations are against University policies and rules, disciplinary action will be taken as appropriate.

Classroom Accommodation: “Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter that must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.”

Course Evaluations: “Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.”

In Person Demeanor: Be respectful, engaging (no wallflowers) and call out anyone (including me) exhibiting a lack of respect or sensitivity. I commit every day to avoid judgments of people. You are graduate students, profession-seekers; so help me in committing us all to open minded collegiality and fairness. In addition, of course, silence your phones, put them away, and talk to us.

WIS 5496: Research Design in Wildlife Ecology and Conservation (SAMPLE)

MODULE I. Essential SCIENCE PHILOSOPHY FOR ECOLOGISTS

FALL 2019	TOPICS		Readings	Work Due
Week of	Tuesday	Thursday		
Aug 20/22	Course Intro, Disc. Conservation Science	Sci Phi for ecology: overview & Inductivism	Pickett ch1 Gillies ch1	
Aug 27/29	Logical Positivism vs. Karl Popper's thesis	Empirical Pluralism: Falsification/Confirmation	Pickett ch2 Gillies ch2	HW1: Reading Concepts
Sept 3/5	Testing w/Confirmation: Explanatory surplus	Ecological Theory: Structure of knowledge	Gillies ch10 Pickett ch3	HW2: Library
Sept 10/12	Understanding & using dynamic theory	Testing theory vs. hypotheses	Pickett ch4	HW3: Conceptual Framework
Sept 17/19	Flexible HDM under Pluralism	Review: Testing in Science & Nature of Theory	Guam bird extinctions	
Sept 24/26	Midterm 1	Student Presentations: My Research Design (pt. 1)		HW4: My Design (pt.1) – Advisor input

MODULE II. Research Design: Strategy, Logic, Inferential Goal

Oct 1/3	Scientific Inference: Survey of flavors	No Class-homecoming	James & McCulloch	
Oct 8/10	Research Designs <i>determine</i> Inference	Does X cause Y? (non-experimental designs)	Quinn & Dunham	HW5: MONEY!
Oct 15/17	How to determine if X causes Y (experimental)	Does X predict Y? (correlation is key; not causation)	Paper diagnoses	
Oct 22/24	Specialized designs	Logical sequences of designs in res. programs	Paper diagnoses	HW6: My Design (pt.2) – Advisor input
Oct 29/31	Midterm 2	Kellogg Logic Model Exer. Sampling design (10 steps)	Green	

MODULE III. Sampling Design: Tactics, Rigor, Feasibility

Nov 5/7	Variable structure Measures	Replication Power analysis	McGarigal; Underwood	HW7: Variable structure
Nov 12/14	Randomization & Bias avoidance	Scale issues are fundamental	Fahrig	HW8: Kellogg Logic Model – Advisor input
Nov 19/21	Ethical Rationality in Conservation/Mangmnt.	Review	S-F & McCoy TBA	HW9: Draft swap/review
Nov 26/28	No Class	THANKSGIVING		
Dec 3 - last	Midterm 3	READING DAY		

FINALS WEEK: Dec 7 (Sat) to Dec13 (Fri)

NO FINAL EXAM

Final Proposal Due Dec 9