

Practical Skills (EnSt/Bio 393)
McDonnell 412, W 5-7 pm

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Office Hours: By appointment

Course web site: <http://www.nslc.wustl.edu/courses/Bio393/bio393.html>

Goals and course overview: This course will serve the primary purpose of providing you with the background you will need to conduct basic ecological research. We will address several of the most important facets of designing and executing biological research, including identifying and properly defining your research question, designing a study to address your question, collecting, organizing, and analyzing your data, and interpreting and presenting your results. We will also apply a substantial amount of time and effort to the process of writing research grants, which for some of you may culminate in the submission of a research proposal to the Biology Dept./Howard Hughes Medical Institute Summer Undergraduate Research Fellows program or for Tyson Research Fellowships or internships. (These fellowships and internships are competitive, and enrollment in the course does not guarantee funding.)

Specific course goals:

1. Learn how to ask and address important (and interesting) questions in environmental biology and ecology
2. Learn and apply the skills necessary to design and complete a research project
3. Learn and apply data management, analysis, interpretation, and presentation
4. Gain experience in grant proposal writing and reviewing
5. Have fun with mud and ticks

Field Trips

Two Mandatory field trips are required for this course.

- (1) Amphibian sampling (to occur at night) and
- (2) Garlic mustard management.

Several dates will be available for each of these field trips, to be announced.

Course material:

- **Required text:** *How to Do Ecology: A Concise Handbook* (2006), Karban and Huntzinger, Princeton University Press.
- **Recommended text:** C.J. Krebs. *Ecology: The Experimental Analysis of Distribution and Abundance*. 6th ed. Benjamin Cummings, San Francisco. 655 pp.
- Additional reading assignments from the primary literature and other sources will be posted online and distributed by email.
- Reading and homework should be completed before the date for which they are listed.

Course Syllabus
*****Extremely Subject to Alteration*****

Week	Date	Topic	Readings and Homework
1	Jan 14	<ul style="list-style-type: none"> Organizational information and course introduction Expectations for the course and future opportunities Goals for the course (survey). What is Ecology? 	<ul style="list-style-type: none"> Required: Dice 1955, Krebs 2006 Recommended: May 1999
	Jan 21 6:30-8 PM	HHMI Information Session http://www.nslc.wustl.edu/Research/HHMI/surf.html	
2	Jan 21	<ul style="list-style-type: none"> Research philosophy, asking good questions, designing studies to answer your questions. Discussion: how would you answer this question? 	<ul style="list-style-type: none"> <i>How to Do Ecology</i>, Chapter 1-3 (pg. 1-59) “Independent research projects” think about topics that interest you
3	Jan 28	<ul style="list-style-type: none"> The primary literature, Using web of science Fill out proposal template/outline Or, write a series of ideas (3-4) and outline your approach(s) to answering them. 	<ul style="list-style-type: none"> “Developing your conceptual framework and significance statement” “How to read papers” generate a specific question that interests you.
4	Feb 4	<ul style="list-style-type: none"> Proposal Outline Due to Mentors (or ideas/approaches worksheet). What makes a good proposal? Student review of example proposals 	<ul style="list-style-type: none"> Strauss 2002 <i>How to Do Ecology</i>, Chapter 6 (pg. 120-129) work on proposal outline (2 pg max)
5	Feb 11	<ul style="list-style-type: none"> Proposal Draft Due to Mentors 	<ul style="list-style-type: none"> revise proposal
6	Feb 18	<ul style="list-style-type: none"> Proposal Draft Due to Class 	<ul style="list-style-type: none"> read and evaluate peer proposals
	Feb 18	SURE/HHMI application deadline, 5pm http://www.nslc.wustl.edu/Research/HHMI/surf.html	
7	Feb 25	<ul style="list-style-type: none"> Peer review of proposals and discussion 	<ul style="list-style-type: none"> Work on proposals
8	Mar 4	<ul style="list-style-type: none"> Field trip this week? (contingent on weather) 	<ul style="list-style-type: none"> Work on proposals
	Mar 4	<ul style="list-style-type: none"> HHMI and Tyson Proposals Due, 5pm 	
9	Mar 11	Spring Break	
10	Mar 18	<ul style="list-style-type: none"> “Statistical analysis” Choosing analyses based on your question and design Introduction to data management Formatting data in Excel, Data analysis 	<ul style="list-style-type: none"> <i>How to Do Ecology</i>, Chapter 4 (pg. 60-81)

11	Mar 25	<ul style="list-style-type: none"> • “Statistical analysis & displaying your data effectively” • Tips on Data presentation: Tables and Figures 	<ul style="list-style-type: none"> • <i>How to Do Ecology</i>, Chapter 6 (pg. 88-104)
12	Apr 1	<ul style="list-style-type: none"> • “Scientific writing, publishing and peer review” 	<ul style="list-style-type: none"> • David Post (Authorship) • Waser et al. 1992 • “How to write backwards”
13	Apr 8	<ul style="list-style-type: none"> • “The art of oral presentation” • Guest presentation(s) and discussion 	<ul style="list-style-type: none"> • <i>How to Do Ecology</i>, Chapter 6 (pg. 104-120) • “scientific posters”
	Apr 11	<ul style="list-style-type: none"> • Saturday field trip-Garlic Mustard experimental management (exact date TBA) 	<ul style="list-style-type: none"> •
14	Apr 15	<ul style="list-style-type: none"> • “Preparing for and choosing a career in ecology” • Part 1: what is graduate school all about? • Sm grp discussion w/ current grad students at Wash U • Recommendation letters: how and who to ask. 	<ul style="list-style-type: none"> • Come with questions!
15	Apr 22	<ul style="list-style-type: none"> • Part 2: Lots of career opportunities in ecology! • Sm grp discussion with non-academics 	<ul style="list-style-type: none"> • <i>How to Do Ecology</i>, Chapter 5 (pg. 81-87)

Additional Resources for literature search:

Web of science: <http://portal.isiknowledge.com/portal.cgi?DestApp=WOS&Func=Frame>

Google scholar: <http://scholar.google.com/>

Ingenta connect: <http://wustl.library.ingentaconnect.com/>