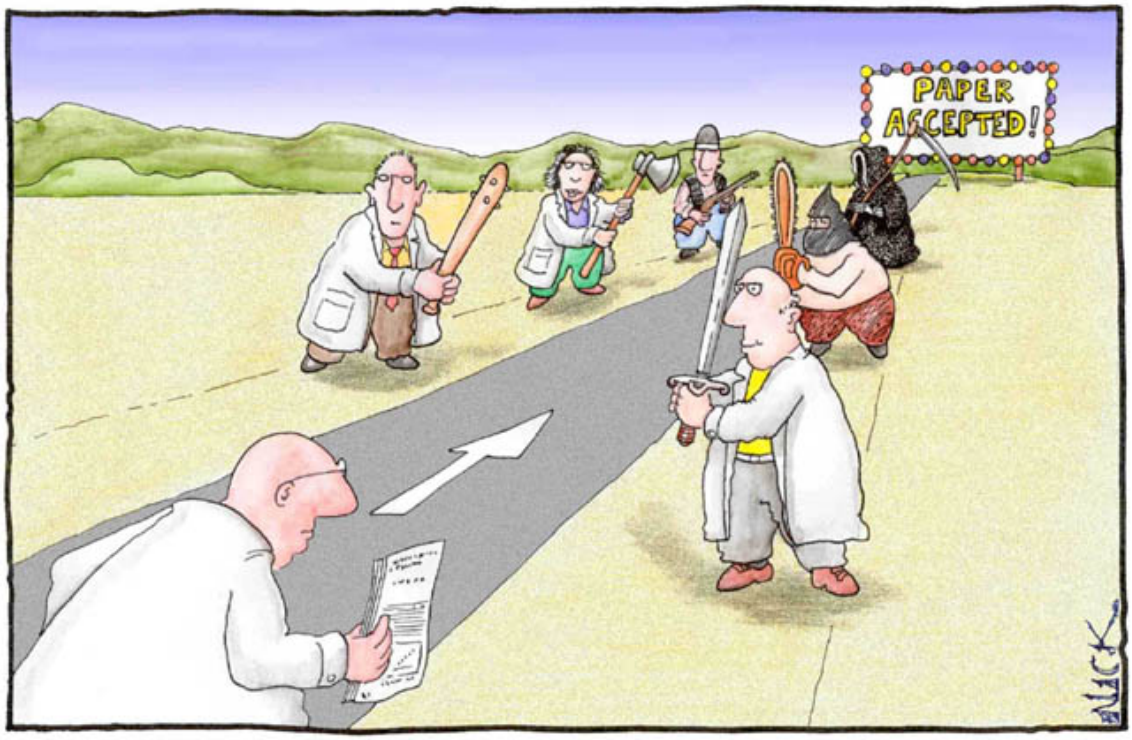
Methods in Ecology and Evolution
Spring 2011 – Section 1
R. Burks



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

Lecture Tuesday/Thursday 8:15 – 11 15 a.m.
Office/Lab: FJSH 141/145; Phone: 863-1280 or 512-869-8098 (no calls post 9pm please)
Office Hours: M/F 12-3 and as needed
Email: burksr@southwestern.edu; Moodle site: lms.southwestern.edu

SYLLABUS PHILOSOPHY: This document should act like an owner's manual for a car. At least read through it once and then keep it available for reference. More or less, everything that you need to know about the course you should be able to find in this document. Reading materials will be posted on Sakai.

COURSE DESCRIPTION: Methods in Ecology and Evolution is an intermediate course in the Department of Biology. It is a foundational-building course that contains instructions on reading the primary literature in ecology and evolutionary biology, conducting literature searches, designing experiments, writing scientific papers, using quantitative methods, exercising critical thinking skills for data analysis, creating graphs and developing specific laboratory skills as needed for ecology and evolutionary biology. As you can see, that is A LOT to accomplish in 8 weeks.

STUDENT LEARNING OBJECTIVES: By the end of the course, students should be

1. Quite adept at finding appropriate peer reviewed literature;
2. Experienced in the concepts of experimental design, data collection and analysis;
3. More skilled at reading primary literature;
4. Cognizant of the important of revision and the constructive feedback of peers;
5. Knowledgeable about the methods of scientific writing; and
6. Better equipped to conduct and analyze statistical analyses.

WORK IN CONCERT WITH BIOLOGY DEPARTMENT STUDENT LEARNING OBJECTIVES:

1. ***Biology Department:*** Students will understand and apply knowledge and concepts about the functioning of living systems.
2. ***Biology Department:*** Students will accurately and thoughtfully identify, evaluate and critique research and research literature on biological phenomena.
3. ***Biology Department***: Students will clearly, accurately and in appropriate styles, communicate about biological phenomena and research orally, in writing and graphically.
4. ***Biology Department***: Students will accurately, appropriately and safely perform physical techniques of biological investigation.
5. ***Biology Department***: Students will accurately and appropriately apply quantitative reasoning and methods to biological problems.

ENGAGEMENT: Students in Methods are expected to be actively engaged with the material. This is a tough course to take in 8 weeks. Students will also come with different skill levels and exposure to statistics, which may make it more challenging for some than others. The key thing to realize early is that SCIENCE TAKES TIME AND THIS CLASS WILL TAKE A LOT OF TIME. Combined with Methods in Cell and Molecular Biology, students receive 4 hours of academic credit for 6 hours in class as occurs with a traditional upper-level biology lecture and lab. In some cases, you will have substantial exercises to complete outside of class time.

An assignment comes do EVERY DAY in this course. You should prepare to devote between 1.5 and 2 hours outside of class for every hour in class. This equates to scheduling an additional 8-10 hours a week to devote to this course.

Students will acquire both writing and analytical skills in the classroom as well as through hands-on experimentation in the lab. This Methods Course also involves a significant writing component. Students are encouraged to consult with me, an available Writing Fellow or the Writing Center on campus early in the writing process.

PARTICIPATION: Regular class participation is the default circumstance for students in upper level Biology courses. Class participation involves discussing primary literature, posing questions about class materials, following thru exercises and working well in groups.

Outstanding	Particularly noteworthy class participation will grant you a 1% benefit of the doubt at final grade time. In other words an 89% B+ would end up as a 90% A-.
Acceptable	Regular class participation assures course standing (no change)
Below Average	**Less than frequent class participation/poor attendance (i.e. 2 unexcused absences) lowers your grade by ½ letter (i.e. B+ = B)**

Unacceptable **N**umber of unexcused absences (> 3) or extreme lack of participation will results in course failure. I will notify you of your status half way through the course (in case improvement is needed). If you are curious at any other time, just ask.

Please note that 2 accounts of being excessively late (beyond 15 minute warm-up window) = 1 unexcused absence. Please be on time.

Texts:

1. Day, R. A. and B. Gastel. 2006. *How to Write and Publish a Scientific Paper*. 6th ed. Westport, Connecticut: Greenwood Press. **ISBN-13:** 978-0313330407
2. Statistics Explained: An Introductory Guide to the Life Sciences by Steve McKillup 2006. Cambridge University Press. $41.00 list **ISBN-10:** 0521543169; **ISBN-13:** 978-0521543163
3. Burks, R. L. 2010. Popcorn Statistics. 2nd edition. (on-line; available for $10)

COURSE MANAGEMENT SYSTEM:

Moodle represents the learning management system now used by Southwestern. This web-based, open source program will be instrumental to this class. You sign into Moodle with your regular su-ID and password either through the SU-Portal or at the website: lms.southwestern.edu. This interactive system will enable you to:

- Download files (primary literature, assignment instructions/rubrics, etc…)
- Keep track of your grades
- Submit assignment and get on-line feedback
- Take quizzes
- Keep a calendar and view each week of the course and the upcoming activities and/or assignments
- Communicate with your peers

STUDENTS' BILL OF RIGHTS FOR METHODS:

1. Each student can expect access course materials prior to class.
2. Although the focus of the class will be on apple snails, students can expect to learn general skills applicable to any ecology topic.
3. Each student can expect that I will arrange appropriate office hours when schedule conflicts.
4. Students can expect to improve their writing & presentation skills.
5. Each student can expect a classroom environment conducive to their learning. If this is not the case, see me immediately.
6. Students can expect that I will be attentive to their needs and flexible if excused absences (illness, sports, etc.) occur.
7. Students can expect Methods to be as "green" or "paperless" as possible.
8. Students can expect to receive additional help from our Writing Fellow, Cameron Clinton (clintonc@southwestern.edu).
9. Students can expect to become really adept at using Moodle.
10. Students can expect that three hours of class will still go quickly.

PROFESSOR AND COURSE EXPECTATIONS FOR STUDENTS

1. Every student will be **on time** to class. This means 8:30 a.m. as we will use the first 15 minutes of class for Q&A. The on-time policy is necessary to maximize the learning potential of the classroom.
2. I expect that students will have read the assigned reading before we cover this material in class.
3. **METHODS expects that you will be responsible for your own mastery of the material.** If you have questions about concepts presented in the text or lectures, it is your responsibility to find the answers to questions or seek my help.
4. I expect that students will provide adequate warning if they are going to miss a class for legitimate academic circumstances. It is the student's responsibility to review the class material and ask questions.
5. I expect the classroom environment to have a relaxed atmosphere where students can feel free to express opinions or ask questions.
6. Students must respect other people's opinions even if they differ from theirs.
7. I expect that students will take some time to reflect on what they are learning.
8. I expect that students will contribute their own intellectual ideas.
9. I expect that, although the course focuses on apple snails, the skill gained can be applied to any set of biological research.
10. I expect that students check their email routinely.

OTHER POLICIES:

- **OPEN COMMUNICATION**
  - Students are expected to discuss questions and areas of concern with me.

- **ATTENDANCE**
  - Students are expected to prepare for and attend each class meeting. See information above for participation guidelines.
  - **More importantly than just attendance, lack of preparation will diminish your capacity to fully engage in the intellectual pursuits and debates of class.**

- **TIMELINESS**
  - **Arrive to class ON TIME – which in the case of the earlier start time for Methods includes a 15 minute grace period. Informal Q&A will start at 8:15 a.m. New material or the start of an activity will begin at 8:30 a.m. If you come in later than 8:15, come in quietly and take your place. Anything less is disrespectful to me and your peers.**
  - **2 late instances = 1 unexcused absence.**

- **EMAIL**
  - I will frequently email to remind you of deadlines or to clarify points from a lecture. Please check your e-mail daily. You may also receive emails from Moodle.

- **DROP DATES:**
  - **Due to the rapid nature of the mini-courses, please note the early dates of 1/27/11 for withdrawal without record entry or 2/14/11 for W.**

LATE PAPERS

- **The best advice is to turn in your work on time**. Moodle will show the deadlines for each of the assignments. At the latest, work should be brought with you and turned in during the beginning of class.

- **A 10% penalty accompanies late work turned in before the next class period.**

- **HONOR CODE**
  - All course work is to be done independently unless otherwise noted. **You should type in the Honor Code on electronic assignments or fill out the questions on quiz items. Please write out and sign the honor pledge IN FULL according to the following:**

I have acted with honesty and integrity in producing this work and am unaware of anyone who has not.

  - If you are unclear on the concept of plagiarism or cannot sign the honor code in good faith, please see your Writing Fellow Cameron or Dr. Burks immediately. When in doubt, paraphrase and cite using Name and Year methods (Burks 2003). Any perceived impropriety will be discussed with the student and then the appropriate action pursued.

- **ACCOMMODATIONS**
  - Southwestern University will make reasonable accommodations for persons with documents disabilities. Students should provide documentation and schedule an appointment with the Academic Services Coordinator (Kimele Carter at x1536 or carterk@southwestern.edu on the first floor of the Prothro Center) **immediately**.

- **FACEBOOK**
  - I'm happy to be "A Friend" with SU students with the knowledge that I am a faculty member at Southwestern first. I will not ask students to be Friends because I do not want to exert inappropriate pressure. As a "friend" and professor, I have a vested interest in students and an obligation to the University to take any concerns that catch my attention seriously. I'm not in the habit of checking up on students but I cannot help but read updates when posted. So, if there were something posted in an update that spoke to a personal concern or threat to any other student, then I feel obligated to follow up on the post. In what I hope to be **rare instances,** my follow-up actions may take the form of a message from me or a call by me to appropriate University personnel better equipped to handle dramatic situations. I think it important that you know this ahead of time. My Profile page serves as an all-inclusive insight into my life for my friends, family and some students. I do not post anything there that I am not willing to publicly share (this is good advice). If you are happy with this "condition," then great. If it makes you at all uncomfortable, then feel free to Defriend - will not take it personally at all.

- **CELL PHONES**
  - Please turn all cell phones to SILENT/VIBRATE during class. You may use cell phones to keep track of the time but should not be actively texting or e-mailing in class. In the case that you need to be in contact with another party (family emergency, etc...), then quietly and unobtrusively leave the room to respond to a call if received. Violation of such policy will reduce your participation score in class.

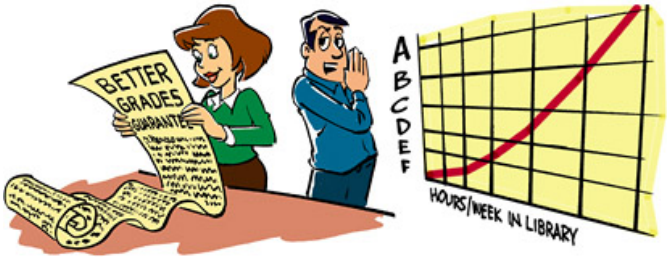
- **LAPTOP COMPUTERS**
  - If such activity enriches your material retention, feel free to take notes during class on a laptop computer. In some classes, we will utilize laptops in class for interactive exercises. At all times, your focus should be on the class activity and not on an alternative activities (i.e. Facebook, e-mail, etc...). Violation of such policy will reduce your participation score in class.

COMPONENTS:
The course is divided into three main components: 1) Writing Exercises; 2) Skill Sets; and 3) a comprehensive Exam. These assignments vary in the points that they are worth, based on the difficulty of the work involved.

Total points = 1000

Minimum **A** = 925 Points	Minimum **A -** = 895 Points	Minimum **B+** = 875 Points
Minimum **B** = 825 Points	Minimum **B-** = 795 Points	Minimum **C+** = 775 Points
Minimum **C** = 725 Points	Minimum **C-** = 695 Points	Minimum **D+** = 675 Points
Minimum **D** = 625 Points	Minimum **D-** = 595 Points	**Below 595** = F

Grades are not curved in any traditional sense. What you earn is what you will receive, although they can be modified by participation as defined.



"Read the fine print in the caption"

Please note: The design of this course is to maximize your ability to succeed. **Many small assignments that do not count as much give you a better opportunity to build your skills.** I have included 5 methods that can help you achieve the grade you desire and deserve. Enrichment limit = 2% of your final course grade (20 points):

1. Outstanding participation can add 1% to your average (10 points).

2. Completing 10 "enrichment" quizzes can earn you up to 10 points.

3. Students can bring 'science snippets' related to issues of bringing a professional scientist/ecologist to share in class with a short summary (up to 5 points each).

4. Students can use one ***"Have a Bad Day Pass"*** where a one-day extension on an assignment can be granted or a "complete redo" on a graded assignment.

5. Utilizing an oral evaluation option if needed on the exam. If a student believes that he/she did much more poorly on the exam than expected (this does not mean a B or B+), then the student can talk to me about the possibility of an oral re-evaluation in which I will pose 4-5 questions for

the student to answer. If the request is granted and the re-evaluation successful, then the exam score may be raised a letter grade or to the minimal passing grade.

AREA	Code	Description	Notes	Due	Points
SKILLS	**A**	Library Lab Scavenger Hunt	Exercise Handout	1/13	50
	B	Methods Diagram from Paper	PowerPoint Figure plus explanation	1/27	50
	C	Library Search Exercise	Exercise Handout	2/.1	25
	D	Code Sheet and Statistical Plan	Word Document	2/3	25
	E	Microsoft Excel	Popcorn Data as Spreadsheet	Rolling	50
	F	SPSS I: Descriptive Stats, t-tests, etc…	SPSS Output and Questions Answered	Rolling	50
	G	SPSS II: ANOVA, Regression	SPSS Output and Questions Answered	Rolling	50
	H	SPSS III: Graphing SPSS	SPSS Output and Questions Answered	Rolling	50
	I	SPSS Analysis of Class Experiment	Annotated SPSS Output with notes	2/15	50
TOTAL	**40%**				**400**
WRITING	**A**	Methods, Results and Graph of Snail Experiment	Word Document 1st Draft	1/18	20
	B	Revision of Methods & Results after peer review	Word Document 2nd Draft	1/20	25
	C	List of questions about papers	Word Document	1/20	20
	D	Abstract Analysis	Word Document	1/25	55 Title=5
	E	Outline of Introduction for Proposal w Primary Lit	Word Document	1/27	50
	F	Revision of Methods & Results; add intro draft	Word Document 3rd Draft	2/8	50
	G	Full Draft Proposal	Word Document	2/15	50
	H	Peer Review of Proposal	Fill out Peer Review Form	2/17	30
	I	Final Proposal with letter of development	Word Document	3/8	100 (20 resp)
TOTAL	**40%**				**400**
EXAM		Comprehensive assessment of knowledge and applications of skills		2/22	200
TOTAL	**20%**				**200 Points**

Date	Activity 1	Activity 2	Chapter Reading and Primary Literature	**Science ChitChat Topics**	***Science ChitChat*** Reading Done	Assignment Due
1/11	Course Introduction	Library Instruction	Use Day & Gastel as a general reference throughout course			
1/13	Execute "Pilot" Experiment as Writing Basis		Day & Gastel: Chaps 1, 3, 4 & 5 McKillup Chapter 2 & 3 ***Rawlings et al. 2007*** ***Burlakova et al. 2008***	Ethics: Methods Actor	Dudycha & Geedey 2004	Skill A
1/18	Methods Peer Review	Scientific Process	Day & Gastel: Chaps 11, 12 Wells 2004 ***Qiu & Kwong 2009*** ***Barnes et al. 2008***	Reading Science	Snow 2010 *Science*	Writing A
1/20	Stats & Design I	Reading Primary Lit	Day & Gastel: Chaps 16 & 17 ***Carlsson & Brönmark 2006*** ***Karatayev et al. 2009*** McKillup Chapter 4	***Open***		Writing B & C
1/25	Abstract Peer Review	Puzzle Papers: ***Connor et al. 2008*** ***Boland et al. 2008*** ***Lach et al. 2000*** ***Fang et al. 2009***	Day & Gastel: Chaps 9 & 10 **Choice:** ***Carlsson et al. 2004*** ***Baker et al. 2010*** ***Burks et al. 2010***	"Teaching" Universities	Jones 2010 *Science*	Writing D on choice of 3 papers
1/27	PP cont./Data Org	Excel: Popcorn Stats I	Day & Gastel: Chapter 7 & 8 Burks 2009 (*L&O)* McKillup Chapter 5 & 6	Gender in Science	Lawrence 2006 *PLOS;* Budden et al. 2008	Skill B using 1 of puzzle papers Writing E
2/1	SPSS Popcorn Stats continued…		McKillup Chapter 7	***Open***		Skill C
2/3	SPSS Popcorn Stats	Design Popcorn Exp	Use McKillup as reference text for rest of statistics	Science & the Media	Excerpts: Dean 2009	Skill D

Date	Activity 1	Activity 2	Chapter Reading and Primary Literature	**Science ChitChat Topics**	***Science ChitChat*** Reading Done	Assignment Due
2/8	Execute Popcorn Experiments			Storytelling	Ch. 4, Olson 2009	Writing F
2/10	Primary Lit Recap	Q & A: stats/proposals		Authorship	Weltzin et al. 2006; Burks & Chumchal 2009	
2/15	Peer Review Proposals & Presentations		Day & Gastel: Chapters 20, 21, 22 & 40 Benos et al. 2003	Peer Review Crisis	Fox&Petchey 2010 *ESA Bulletin*	Writing G, Skill I
2/17	Peer Review Discussion	Exam Review		***Open***		Writing H
2/22	Grade Exam		Day & Gastel: Chapter 37	Broader Impacts	Loc et al. 2010	Exam
2/24	**No Class – Go to Brown Symposium**					Skills E, F, G, H* Writing I
3/2	To be a Scientist	Evaluations		Mentoring	Lee et al. 2007	
		*Stats can be turned in earlier				

Course Goals:

1) Increase your ability to engage with primary literature (LIBRARY & READING EXERCISES)

2) Teach skills in experimental design and data analysis (POPCORN LAB AND SNAIL RACES); and

3) Improve your technical writing ability (WRITING EX ERCISES AND PROPOSAL)

1/11:

1. Talk about the thinking, writing and publication process – real essence of science
2. Discuss Necessary and Unnecessary Details

1/13:

1. Hands-on experience with the snails
2. Work as a group to execute single experiment

1/18:

1. Realize how many parts actually go into a scientific paper
2. Introduce Project –Research proposal about apple snails; Idea is that everything links together.
3. Also discuss framework of scientific paper

1/20:

1. KEY CONCEPT IN PAPER DISCUSSION: What is means to be significant;
2. Relationships between *p* (probability) & confidence, df and critical statistics (found in tables);

1/25:

1. Components of abstract/summary
2. Framework for an introduction
3. What belongs in Methods
4. What figures are graphed
5. Framework for Discussion

1/27:

1. Learn how to organize data
2. Quality checks

2/1:

1. Know what happens as you increase sample size and relationships between mean, SD, SE & 95% CI;
2. Conduct t-test by hand
3. Be able to code data in SPSS and run and interpret basic statistics (this includes correctly cutting & pasting from Excel).

2/3:

1. To start applying statistics learned to experiments performed.

**NOTE POPCORN STATS LABS ARE DUE ON A ROLLING DEADLINE

2. To be able to think about how to graph different types of data;
3. To format graphs in SPSS;
4. To learn to integrate graphs into other programs

2/8:

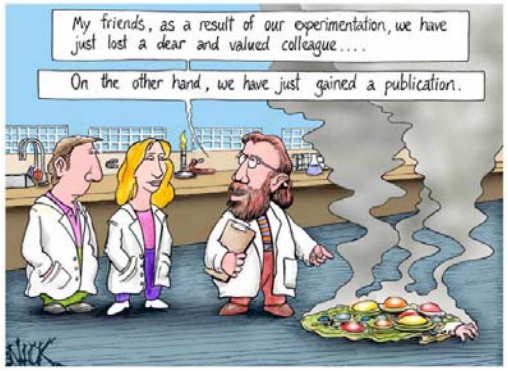
1. Put it all together: Instructions to Authors: http://esapubs.org/esapubs/authors.htm
2. Introduction, Proposed Methods, Proposed Stats, Preliminary Data, Anticipated Results (with “hypothetical figures”, Literature Cited (8 that includes Burlakova et al. 2008, Barnes et al. 2008, Karatarev et al. 2009, Carlsson & Brönmark 2006 + 4 others)

2/10:

1. Review primary literature papers covered and content
2. Review Instructions to Authors from Ecology

2/12:

1. Improve overall quality of proposals and prevent procrastination
2. To mimic the publication process



FINAL NOTE: I love methods. I love statistics. I love teaching students how to do science. Thus, sometimes, I can get a little overzealous. I have worked hard to design a course that I think will greatly benefit you in your future courses and hopefully your own research. Of course, there is a caveat. This is always a course in development – so, as things go along, PLEASE come and talk to me about how it is going and if we need to make any other considerations (although the syllabus schedule is pretty prescribed, THERE IS ALWAYS ROOM FOR CHANGE)

Under Assignment, please complete the syllabus check:

I, _____, have read the Methods syllabus & acknowledge its contents.

Furthermore, I specifically confirm that:

- The syllabus was reviewed in class and the expectations for my success in Methods are abundantly clear.
- I asked all the questions I had about the syllabus at this time. I will ***first*** consult the syllabus and/or handouts when I have a question about an assignment. If the answer is not to be found, then I will ask.
- I understand the exam option of "redo" and "oral re-evaluation."
- I will execute Take-home Exams and Abstracts in accordance with the Southwestern Honor Code.
- I have put all dates in my calendar and/or posted a schedule for Methods where I can use it every