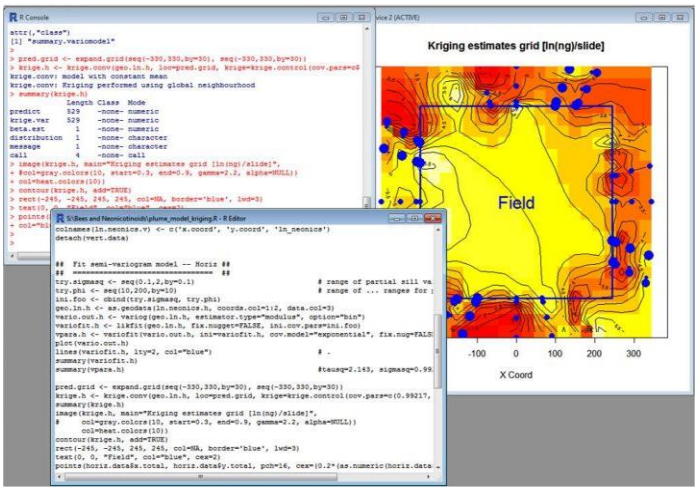
Analysis of Ecological Data
ENTM 69200
Course Syllabus



Spring semester 2015
1 lecture + lab = 2 credits

Instructor
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Office hours: Any time you want them if I am not previously scheduled. Contact me any time by phone or email. In the first class we will set one hour a week that I will be available in my office and on the Blackboard chat room for this course.

Prerequisites
A previous graduate-level course in statistics is required. Students will require a laptop for the lab sessions.

Course Description
This course will introduce graduate students to several different analysis options for biological or ecological data. It will also empower students to further expand their "analysis toolbox" by introducing them to free & open-source statistical, mapping, and graphing platforms that can be explored and customized after the course is completed. Broad topics covered will include: univariate, multivariate, parametric and non-parametric analysis and their basis; design of experiments and observational studies; advanced graphical techniques; basic mapping with and without geographical information systems; simulation modeling of simple biological or ecologial systems; and coding to accomplish all of the above. Undergraduate level mathematics, calculus, trigonometry, and matrix algebra will be used. As much as possible, the data sets examined in lab and the examples in lecture will draw upon ecological or biological studies, often from entomology. The techniques however, will be applicable to many fields.

Course Outcomes
Upon successfully completing this course students will:
1) Know how to plan experiments and observational study data collection,
2) Be able to apply several univariate and multivariate statistical analyses,
3) Be able to model or simulate simple biological or ecological systems,
4) Use several different graphing techniques including mapping, three-dimensional plots, and animations,
5) Learn to write code to accomplish 1 – 4 within the R platform (among others).

Text
There is no set text for this course. I will provide readings as necessary and a list of online resources and references related to each lecture. A good reference on statistical programming will be a valuable resource that many will use often for years to come. For this, I suggest The R Book by Crawley.

Grading Policy
Grades will come from a combination of a single semester-long project and weekly assignments. There will be no exams in this course.

13 assignments x 20 points = 260
1 semester project x 40 pts = 40
300 points

A+	285 – 300	C+	200 – 209	F	< 150
A	255 – 284	C	190 – 199		
A-	240 – 254	C-	180 – 189		
B+	230 – 239	D+	170 – 179		
B	220 – 229	D	160 – 169		
B-	210 – 219	D-	150 – 159		

Attendance Policy
I expect students to be in attendance for all lectures and laboratories, and I will not provide course notes. There will be some, but not complete, overlap between the lecture material and the readings. While I will not take attendance, it will be difficult to receive a good mark if students miss scheduled lectures or laboratories.

Academic Honesty
"To foster a climate of trust and high standards of academic achievement, Purdue University is committed to cultivating academic integrity and expects students to exhibit the highest standards of honor in their scholastic endeavors. Academic integrity is essential to the success of Purdue University's mission. As members of the academic community, our foremost interest is toward achieving noble educational goals and our foremost responsibility is to ensure that academic honesty prevails." (Purdue University Regulations, Part 5, Section II). To this end, any instance of plagiarism, cheating, dishonesty, or the aiding of such will result in a grade of 0 for the assignment. If a second instance occurs the student will be reported to the Office of the Dean of Students. I consider the passing on, or receiving, of notes to students of subsequent years to fall into the categories above.

For this course, I will consider plagiarism to include the use of code from online or elsewhere without proper citation within the code itself. Small sections of code may come from properly cited sources, but the majority should be written by the student. Students are able to consult with each other to problem-solve and trouble-shoot code, but each student must submit their own code and written assignments.

Students with Disabilities

"Students with disabilities are expected to meet the same academic standards as all students in their respective programs. In some cases, however, it is necessary that they receive academic adjustments to make the educational opportunity more accessible. Academic adjustments may include, but are not limited to, alternative testing methods, copies of instructor notes, enlarged handouts, distraction-limited testing, extra time for exams, no in-class spelling penalty, note-taker in class, readers, in-class sign language interpreter, permission to tape record lectures, etc. To receive academic adjustments, a student must register with and provide documentation of his or her disabling condition to the Adaptive Programs staff of the Office of the Dean of Students." (Purdue University Policies and Procedures, on-line handbook).

Assignments

Weekly lab assignments will be given out in the Wednesday lab period. These will be due at the beginning of the following lab period. Two of the 20 points available for each assignment will be deducted for each day late, i.e., 2 points beginning during the lab period due, etc. For each assignment, students will upload a single text file (*.txt or *.R) to the blackboard system along with any necessary data files (*.csv) and a brief description of what they have done in a word processor file. The instructor should be able to open the txt or R file script and run the assignment. Further details on assignments will be given out in lab periods.

Students will be given details on the semester-long project in class. There is much leeway in the topic of this assignment. This semester-long project will be due in the final laboratory period.

There are no exams in this course.

Course Schedule
Subject to change to accommodate time necessary for the different topics.

Date	Lecture Topics	Lab Topic	Assignments Due
Mon., Jan. 12	Regression, not like you've seen it		
Fri., Jan. 16		R basics, regression	
~~Mon., Jan. 19~~	MLK Day – No class		
Fri., Jan. 23		R basics, regression, basic graphics	1-Regression I
Mon., Jan. 26	Distributions, transformations		
Fri., Jan. 30		Distributions, transformations, basic graphics	2-Regression II
Mon., Feb. 2	Logistic regression		
Fri. Feb. 6		Logistic regression	3-Distributions
Mon., Feb. 9	p-values, hypotheses, randomizations		
Fri., Feb. 13		Randomizations	4-Logistic regress.
Mon., Feb. 16	Multivariate association		
Fri., Feb. 20		SIMPER, RELATE	5- Randomizations
Mon., Feb. 23	Cluster analysis		
Fri., Feb. 27		Cluster analysis	6-Association
Mon., Mar. 2	Principal components analysis		
Fri., Mar. 6		Principle components analysis	7-Cluster analysis
Mon., Mar. 9	Factor analysis		
Fri., Mar. 13		Factor analysis	8-Principle comp.
~~Mon., Mar. 16~~	Spring Break		
~~Fri., Mar. 20~~	Spring Break		
Mon., Mar. 23	Discriminant analy., MDS		
Fri., Mar. 27		Discriminant analy., MDS	9-Factor analysis
Mon., Mar. 30	Redundancy analysis & CCA		
Fri., Apr. 3		Redundancy analysis & CCA	10-Discr., MDS
Mon., Apr. 6	Process simulation		
Fri., Apr. 10		Simulation	11-RA & CCA
Mon., Apr. 13	Random walks, literal & figurative		
Fri., Apr. 17		Random walks	12-Simulation
Mon., Apr. 20	Variograms, kriging		
Fri., Apr. 24		Variograms, kriging, mapping	13-Random walks
Mon., Apr. 27	Graphics options		
Fri., May 1		3d graphics and animation	