Fall 2016

PCB 6466 Methods in Experimental Ecology I (3 cr.)

Where & When: BIO 305, Mon & Wed 1:00 – 2:20 pm

Who: Dave Jenkins, BIO 111B, 823-1660, david.jenkins@ucf.edu [email to schedule meeting]
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Resources:

- http://jenkins.cos.ucf.edu/classes/pcb-6466-methods-in-experimental-ecology/
- Dropbox folder shared with you – for recorded lectures, etc.
- Hector, A (2015) The new statistics with R – an introduction for biologists. Oxford. ISBN 978-0-19-872906-8 http://www.allbookstores.com/book/compare/9780198729068

Course description: Learn how to design, analyze and interpret experiments and quantitative observations. Introduction to modern statistical software and basic statistical methods needed to collect, organize and interpret data critically. For beginning graduate and senior undergraduate researchers, this course bridges between undergraduate stats and Methods II.

Weekly Format:

1. Listen & watch recorded lectures (.mp4 files, in Dropbox [DB]) ***BEFORE*** class
2. Read related chapter and other materials ***BEFORE*** class
3. Come to class to learn by doing, with our help. Save annotated code !
4. Do homework and submit on time

Main goals for Students:

- Design efficient and effective sampling programs and experiments
- Avoid design mistakes that are potentially "fatal" to your work
- Learn how to correctly select and conduct essential statistical analyses in R
- Learn the limits of those analyses relative to advanced methods

Student Responsibilities:

- Do all steps of the weekly format (above), every week.
- Complete all assigned work on time, completely and correctly, and participate fully
- Follow the University standards for personal and academic conduct (http://www.goldenrule.sdes.ucf.edu/).

Student Performance Evaluation:

- 12 homework assignments. 10 points each = 120 points
- Cumulative Final 30 points
- Total = 150 points
- Grade scale: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F= below 60%

Schedule: Video and reading resources are in Dropbox (some files are too large for Webcourses) unless linked otherwise. In-class materials will be on the course web site for easy access. Schedule may be adjusted, with notice – see next 2 pages. In-class work and homework is cumulative; *it is assumed in assignments and grading that you accrue knowledge and skills.*

Week	Videos etc. **(before class)**	Reading **(before class)**	In-Class Topics	Assignments
1 (22-24 Aug)	Installing R & RStudio RStudio Orientation (DB) swirlstats.com Plot: generic X-Y Plotting	R passes SAS in scholarly use R is still hot and getting hotter Much ado about *p* But stats are > *p* Hector Ch. 1 & Appendix	Course overview & goals The new statistics Intro to R & RStudio	Install software Make a plot in R. Any plot.
2 (29-31 Aug)	Data basics (DB) Handling data (DB) dplyr lesson 1 (youtube) or read it dplyr lesson 2 (youtube)	Hypotheses 1 , 2 , 3 Not just a theory Chamberlin (1890) Platt (1964) McGill et al. (2006) excerpt Ecology & strong inference	Readings discussion Data handling in R	Homework #1 (Due 7 Sep)
3 (5-7 Sep)	**LABOR DAY** - - - - Intro to Experimental Design (DB)	- - - - Quinn & Keough excerpt (DB) Aho et al (2014) (DB) Helicopter experiment	- - - - Designing research for model selection	Homework #2 (Due 12 Sep)
4 (12-14 Sep)	Study design & model selection	Helicopter experiment	Design & conduct helicopter expt.	Homework #3 (Due 19 Sep)
5 (19-21 Sep)	Graphing data (DB) Graphing (youtube)	Getting Started with Charts in R Plot: generic X-Y Plotting ggplot2 & cowplot, lattice	Handle & graph helicopter data (DB)	Homework #4 (Due 23 Sep)
6 (26-28 Sep)	Probability (DB) Distributions (DB)	Normality tests Homogeneity tests Count data	Graphing copter data II (DB) Transform copter data? (DB)	Homework #4 (Due 23 Sep)
7 (3-5 Oct)	ANOVAs I (DB) z- and t-tests (DB)	Hector (2015) Ch. 2 & 3	Helicopter ANOVAs I (DB)	Homework #5 (Due 7 Oct)
8 (10-12 Oct)	ANOVAs II (DB) Model selection (w/ AIC)	Hector (2015) Ch. 6 Anderson et al. (2000) (DB) Anderson & Burnham (2002) (DB)	Readings discussion ANOVAs & AICc (DB)	Homework #6 (Due 14 Oct)
9 (17-19 Oct)	boxplot, SD, SE, or CI?	Hector (2015) Ch. 5	CIs & power of helicopter data (DB)	Homework #7 (Due 28 Oct)
10 (24-26 Oct)	Bivariate Regressions (DB) SMA Regressions (DB)	Hector (2015) Ch. 6 Warton et al. (2002) (DB)	Linear regressions (DB) SMA regression (DB)	Homework #8 (Due 4 Nov)

Week	Videos etc. **(before class)**	Reading **(before class)**	In-Class Topics	Assignments
11 (31 Oct - 2 Nov)	ANCOVAs (DB) Multiple Regressions DB)	Hector (2015) Ch. 7	ANCOVAs (DB) Multiple regressions (DB)	Homework #9 (Due 11 Nov)
12 (7-9 Nov)	Generalized Linear Models I & II (DB)	[Hector (2015) Ch. 8, 9	GLMs I (DB) GLMs II (DB)	Homework #10 (Due 18 Nov)
13 (14-16 Nov)	Intro to mixed effects models (DB)	Hector (2015) Ch. 10	Mixed-effect ANOVAs GLMMs (DB)	Homework #11 (Due 25 Nov)
14 (21-23 Nov)	Logistic regressions **THANKSGIVING** - - - -	- - - -	Logistic regressions - - - -	
15 (28-30 Nov)	Study design & analyses based on model selection (DB)	Review above	Review & in-class practice **Cumulative Final Exam to you 30th**	Homework #12 (Due 25 Nov)
16 (5-7 Dec)	**Finals Week**	**Finals Week**	**Finals Week**	**Final DUE 7th**