ECOL 411/ MARI451 – "Reading Ecology" and "Special Topic Marine Science" - (20 pts)

Course coordinator: Professor Stephen Wing

Venue: Department of Marine Science Seminar Room (140)

Time: Mondays between 1-4

Description:

This literature-based seminar paper is designed to provide exposure to the best practice for science writing and presentation of scientific results in ecology by examining current articles in the ecological literature. The paper will provide a vehicle for keeping up-to-date with the literature and with new methods by carefully examining the newest research articles across a broad range of subject matter in ecology. We will read and discuss recent articles from a group of the highest impact ecological journals, representing the best current ecological research.

Procedure:

Because this is a literature-based paper the preparation of presentations and discussion of each research article will be run by students, with facilitation by the course coordinator.

On the first day of class (Mon Mar 7, 1 pm, Rm 140 Marine Science Department) we will set the schedule of presentations by lottery. **We will then begin with introductions and each student will present their research topic with two concise objectives for the research.** These two objectives will become the focus for papers covered in class. The goal here is to translate these research objectives into testable hypotheses or models informed by data using current examples from the literature as a guide. A secondary goal is to place your research in the context of global issues in the science of ecology. That is build a theoretical context for your work.

Each week we will examine three papers. In order to prepare for each upcoming session all the students enrolled in the course will carefully read the selected articles for the upcoming week. The three students who are giving paper presentations for that week will each pick one article to present and e-mail the reference for that article by Wed of the proceeding week to the course coordinator for distribution. Each presentation of the literature should conclude with two slides focussed on the questions:

1) How does your work fit in the context of the core ecological issue examined in this paper?

2) How will your work extend our knowledge on this topic?

Articles will be chosen from recent (2012-15) volumes of:

Ecology

Ecological Applications

Journal of Animal Ecology

Journal of Ecology

Journal of Applied Ecology

The Ecological Society of America journals are available online at:

http://esapubs.org/

British Ecological Society journals as available online at:

http://www.britishecologicalsociety.org/journals_publications/

In addition to the paper presentations each week the course coordinator will be giving a short research talk highlighting a research topic, methods and application of ecological science to conservation and management (see attached schedule). In these talks emphasis will be placed on presenting a toolbox for ecological science in terms of methods, experimental design, statistics and presentation.

I encourage you to go paperless for this exercise.

Assessment will be based on two presentations of articles (see attached marking sheet) (33% each), and one essay exam (picked from five choices) to be assigned for the last week of class (34%) (see attached example).

The essay exam is due on June 10th.

Assessment: Oral Presentations of Current Literature

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Scientific Content: (50%)

1) -- Covers main scientific points of paper(s)

2) -- Asks thoughtful questions about results/conclusions

3) -- Identifies implications of results

Visual Aids: (25%)

4) -- Clearly present main points of presentation

5) -- Well organized and easy to understand

6) -- Effective use of charts and graphs

Oral Presentation: (25%)

7) -- Speed and audibility

8) -- Adaptation to audience

9) -- Language concise and appropriate

10) -- Effective ad-libbing

Essay topics for Ecology 411 “Reading Ecology”

This is a two-part essay exam (1200 WORDS PER SECTION):

a) Identify the underlying ecological paradigm for your study question/system. Find the original reference and outline the assumptions and supporting data for the original idea. How has the original idea been modified by ecological studies since the groundwork was done. Give at least 2 examples from the papers that we covered in class.

b) Using an example study system, design a statistical approach that will balance the advantages and disadvantages of hypothesis testing and statistical estimation. Give a logical justification for the approach in terms of advantages and disadvantages for each statistical tool. Here the goal is to develop an approach that uses 2-4 statistical tools to make a balanced logical argument. Use examples from papers we covered in class to highlight scientific approaches (cite as many of our focus papers as you can).

A Basic Ecological Toolbox

A) Estimation and Inference: Fitting data to models

1) Correlations, Regressions
2) General Linear models
3) Model based inference: AICc, BIC and other ranking of correlation
4) Goodness of fit for non-linear models: General additive models
5) Time series analysis, frequency and coherence (autocorrelation, cross correlation)
6) Geostatistics, spatial patterns

B) Multivariate data: describing similarity

1) Multivariate data: categories and variables
2) Similarity metrics
3) Ordination and visualizing similarity patterns
4) Distance based linear models: estimation in multivariate space

C) Hypothesis testing 1: resolving differences among groups

1) Describing the mean and variance of a sample
2) Testing the difference among means (t and F distributions)
3) Power analysis and detectable differences among means
4) ANOVA design, multiple factors, crossed, nested and repeated measures
5) ANCOVA and mixed models
6) Multiple Analysis of variance and PERMANOVA
7) Hypothesis testing with multivariate data

D) Hypothesis testing II: frequencies and non-parametric

1) Chi square models: testing differences in proportions
2) Contingency tables
3) Ranked non-parametric
4) Survival and binomial models

Schedule (Monday 2-5, MARI 140)

1 March 7 - Introduction

2 March 14 – Anatomy of a Journal Article

3 March 21 – Environmental Forcing: Physiology to Ecology

4 March 28 – Easter and mid semester break

5 April 4 – Regression, Correlation and Time Series Analysis

6 April 11 – Multivariate Data and Methods

7 April 18 – Systems Ecology: Isotopes and Sea Ice

8 April 25 – ANZAC Day

9 May 2 – Model Based inference: AIC, GLM and Regression ranking

10 May 9 – Review of Toolbox: matching tools and logic to the job

11 May 16 – Biological Vectors, Connectivity and Spatial Dynamics in Ecology

12 May 23 – Anatomy of a proposal with some notes on getting the grant