Analysis of Ecosystems
RNG 765
Fall 2016

DEVAN ALLEN MCGRANAHAN

INSTRUCTOR INFO		COURSE INFO	
Office	Morrill 201D	Classroom	EML 326
Extension	x1-7868	Meeting times	Tu/Th: 11:00-12:15
NDSU e-mail	devan.mcgranahan	Office hours	by appointment

Overview

Course objectives

- Develop data analysis and presentation skills relevant to ecologists and ecosystem managers.
- Obtain better-than-beginner proficiency with programming in the `R` statistical environment.
- Understand when and how to use multivariate statistical analyses in the vegan package for `R`.

Course outcomes

At the conclusion of this course, students will be able to:

- Explain basic statistical principles with respect to ecological data and study design, and interpret research results with respect to these principles.
- Use the `R` statistical environment to analyse & present data in ways typical of ecological applications.
- Use the `vegan` package in the `R` environment to analyse and present multivariate data.
- Apply basic principles of presentation and graphing to ecological data.

This is not a course in statistics!

This is a course in data... data analysis, interpretation, and presentation, with a focus on the context and applications frequently encountered by ecologists and ecosystem managers.

Course materials

- Students must keep active on `Blackboard` for course announcements and assignments.
- This course will also depend heavily on material posted to Google Drive, linked via `Blackboard`.
- Students will be expected to have activated their NDSU Google Drive accounts and bring a USB memory device to each class meeting.

Evaluation

Course requirements are divided into more-or-less weekly homework assignments, a salon presentation, a final project, and a final exam. Each are weighted as 25% of the final grade.

Homework assignments

Students will apply recently-presented material to analyse and/or present provided data. Completed assignments will be uploaded to `Blackboard` prior to the next class period. Submissions will include results, write-up, and `R` code as assigned. Homework will also include `Blackboard` quizzes and reflections on assigned readings.

Salon

> ***sa·lon****. noun. a meeting of intellectuals or other eminent people.*

To encourage integration of course material and students' research, each student will lead at least one salon in which they present an analysis, graphing, or general coding problem and lead an in-class discussion on potential solutions. Salons will last at least 15 minutes. Students will be responsible for scheduling their own salon by notifying the instructor at least two days ahead of the desired class period. No more than two will be scheduled per day so students must plan to present salons throughout the semester.

Final project

Students will apply course material to analyse and present data of their choosing; data will ideally come from students' own research, but alternative datasets are allowed. It is the responsibility of each student to ensure they have appropriate data for the final project. **A one-page proposal is requested by end of Week 10**. Graphs and/or tables, `R` code, and a two-page summary of the problem, methodologies, and results will be submitted to `Blackboard`. **Final project is due 11:59pm Friday of Dead Week**. This submission will be graded and comments returned, after which students will have until Wednesday of Finals Week to submit a revision to be considered for an improved grade. *Revisions are optional* and the grade marked on the Friday of Dead Week will stand as the final grade if no revision is submitted. Extra credit might be offered to encourage early submission during Dead Week; details will be provided during the semester.

Final exam

The final exam will be similar to the final project, except done in-class and with provided data. Students will apply course material to analyse and present data. Graphs and/or tables, `R` code, and a brief summary of results will be submitted to `Blackboard`. This will be an "open book" exam in which students will have full access to notes, course materials, and the Internet.

Attendance and participation

Attendance is important. According to NDSU Policy 333 (http://www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. Although attendance will not be explicitly taken, absences will be noted. Veterans and student servicemembers with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders. Active engagement in the classroom is expected. Students are encouraged to both ask and answer questions. This exchange should cross between the instructor and the students as well as among students.

Contract of Responsibilities

Academic honesty will be strictly enforced. Participation in the course also implies a pledge to the following Contract of Responsibilities:

The Instructor agrees to:

1. Maintain a safe, respectful, and intellectually supportive learning environment,
2. Provide clear instructions, feedback, and explanation of evaluation, and offer clarity when requested,
3. Be available outside the classroom for questions on course material and promptly reply to e-mail.

The Student agrees to:

1. Respect fellow students and approach their contributions cordially,
2. Request clarification on assignments promptly and notify the instructor of issues in the course,
3. Complete all work in accordance with the highest standards of academic integrity.

Students are encouraged to consider their environmental footprint when printing course materials, etc., not just in this course, or in this semester, but throughout their life at NDSU and beyond. Strive to live, as Aldo Leopold put it, "as plain members and citizens of the biotic community."

Course schedule

Week (Dates)	Topic
1 (23 & 25 Aug)	Introduction to R
2 (30 Aug & 1 Sept)	Introduction to Rstudio
3 (6 & 8 Sept)	Principles of data visualisation
4 (13 & 15 Sept)	Data distributions & model assumptions
5 (20 & 22 Sept)	Review of inferential statistics
6 (27 & 29 Sept)	Fitting linear & non-linear models
7 (4 & 6 Oct)	Model selection
8 (11 & 13 Oct)	Fitting mixed-effect models
9 (18 & 20 Oct)	Confidence intervals & effect size
10 (25 & 27 Oct)	Introduction to multivariate analysis of community data
11 (1 & 3 Nov)	Community data & ordination
12 (8 & 10 Nov)	More ordination: Analysis of ecological gradients
13 (15 & 17 Nov)	R as GIS: Introduction to spatial data & mapping
14 (22 & 24 Nov)	Tu: catch-up. Th: Thanksgiving break
15 (29 Nov & 1 Dec)	Surveys and text-based data
16 (6 & 8 Dec)	Catch-up and/or new topics
17 (13 Dec)	In-class Final Exam 8:00 am Tuesday, 13 December

Fine print

CAFSNR Syllabus Attachment – Fall 2016

Academic Honesty: All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (http://www.ag.ndsu.edu/academics/honor-system-1). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work best when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Students with special requirements: Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in Wallman Wellness Center 170 (231-8463). http://www.ndsu.edu/disabilityservices/.

Veterans and military personnel: Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.

Important Dates

August 31	Last day to add classes via Campus Connection
August 31	Last day for no-record drop of classes @ 100% refund
August 31	Last day to withdraw to 0 credits @ 100% refund
September 5	Labor Day holiday (no classes/offices closed)
September 6	Financial Aid applied to Student Accounts
September 12	Last day to submit request to audit, pass/fail
September 16	Undergraduate fall graduation application due
September 23	Graduate student fall Intent to Graduate forms due
October 14	Grades of Incomplete convert to F
October 24	Advising begins for Summer/Fall semesters
October 31	Spring registration begins
November 11	Veteran's Day (no classes/offices closed)
November 13	Last day to withdraw to 0 credits
November 13	Last day to drop classes with record (W)
November 24-25	Thanksgiving (offices open on Friday)
December 2	Fall commencement participation deadline
December 5-9	Dead Week
December 12-16	Final Examinations
December 16	Commencement
December 22	Fall grade access begins online