Applied Quantitative Methods (EVSS 695 / BIOL 453)

Dan McGlinn

January 13, 2015

College of Charleston, Department of Biology, Spring 2015

Course and Instructor info:

- Meeting time: 6:30-9:30 pm W; HWWE 307
- Instructor: Dr. Dan McGlinn
- Email: mcglinndj@cofc.edu
- Office: HWWE 203
- Phone: 843-953-0190
- Office hours: 11:30 - 12:30 p.m M or email by an appointment

Course Description:

This course is a three hour seminar for graduate and advanced undergraduate students. The goals of the course are to expose students to more advanced and applied topics in statistical analyses, as well as, provide students the opportunity to apply these methods to their own projects.

Course Structure:

The course will be roughly divided in half between time spend learning about tools and time spend developing one's own project.

Course Objectives:

1. To develop knowledge and exposure to modern quantitative methods such as (but not limited to):
    - R programming
    - Version control
    - Database SQL
    - GIS tools
    - Spatial statistics
    - Multivariate Statistics
2. To develop a project using some combination or these tools to addresses a scientific question.
3. To improve oral presentation and peer-teaching skills

Student Evaluation:

Graduate Students will be evaluated based on the following criteria: * 5% Participation * 5% Peer Teaching * 45% Assignments * 45% Project - 15% oral presentation - 15% project code - 15% written description of analysis (e.g., Methods and Results section of a paper)

Undergraduate Students will be evaluated based on the following criteria: * 5% Participation * 45% Assignments * 50% Project - 25% oral presentation - 25% project code

Project - The project in this course may span a wide range of potential topics to be discussed as the course progresses.

Prerequisites:

Introductory statistics is required. Programming experience is not required but an interest in learning how to program is required.

Course Schedule:

- Jan 14 - Week 01 - Introduction to R
- Jan 21 - Week 02 - Introduction to Version Control and the Terminal
- Jan 28 - Week 03 - Regression and Model Selection
- Feb 04 - Week 04 - Multivariate Models
- Feb 11 - Week 05 - Spatial Models
- Feb 18 - Week 06 - GIS manipulations
- Feb 25 - Week 07 - Simulations and Null models
- Mar 04 - Week 08 - Spring Break (no class)
- Mar 11 - Week 09 - Project Pitch (oral presentation)
- Mar 18 - Week 10 - Work on class project
- Mar 25 - Week 11 - Work on class project
- Apr 01 - Week 12 - Work on class project
- Apr 08 - Week 13 - Peer Code Review and Peer Feedback
- Apr 15 - Week 14 - Work on class project
- Apr 22 - Week 15 - Finalize class projects - Code and Written project components due Friday Apr 24
- Apr 29 - Week 16 - Project Presentations

Course Policies:

Class time - Our time in class will be used primarily for 1) learning new quantitative methods, 2) working on exercises, 3) presenting to the rest of the class, and 4) developing student projects.

Assignments - Most weeks during the first half of the semester there will be a homework assignment associated with the content learned in lecture. Your code and a written explanation of your solution are required. Although I encourage collaboration on code development, your explanation of your solution should be written in your own words. The assignment should be submitted via email to mcglinndj@cofc.edu with the subject line: Programming Assignment X, where X is the number of the assignment. One problem from each assignment (selected at my discretion after the assignments have been submitted) will receive a thorough code review and a detailed grade. Other problems will be graded as follows:

- Produces the correct answer using the requested approach: 100%
- Generally uses the right approach, but a minor mistake results in an incorrect answer: 90%
- Attempts to solve the problem and makes some progress using the core concept: 50%
- Answer demonstrates a lack of understanding of the core concept: 0%

Late assignments will be docked 20% and will not be accepted after Sunday Night at 11:59 pm Eastern Time except in cases of genuine emergencies that can be documented by the student or in cases where this has been discussed and approved in advance. This policy is based on the idea that in order to learn how to program well students should be programming at least every other day. Time has been allotted in class for working

on assignments and you are expected to work on them outside of class. It is intended that you should have finished as much of the assignment as you can based on what we have covered in class by the following class period. Therefore, even if something unexpected happens at the last minute you should already be close to done with the assignment. It also allows me to provide rapid feedback by returning assignments quickly, which is crucial to learning.

Final grades will be assigned based on the following scale:

- **A 93-100**
- **A- 90-92**
- **B+ 87-89**
- **B 83-86**
- **B- 80-82**
- **C+ 77-79**
- **C 73-76**
- **C- 70-72**
- **D+ 67-69**
- **D 60-66**
- **F <60**

Students with Disabilities and Special Needs - The College will make reasonable accommodations for persons with documented disabilities. If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact the Center for Disability Services (CDS/SNAP program) located in the Lightsey Center, Suite 104, 953-1431, SNAP@cofc.edu. If you have a documented disability and need accommodations, please come talk with me and bring your Professor Notification Letter (PNL) as soon as possible. SNAP students are requested to make arrangements with the instructors well in advance of exams.

Academic integrity – Academic integrity is essential at the College of Charleston and to the practice of science. You will therefore be held to a high standard of integrity in this course. Plagiarism, lying, cheating or attempted cheating are violations of the College's honor code. Any honor code violations that occur will be handled as outlined in the student handbook. Please be absolutely sure that you understand what the honor code requires of you (see pages 10-12 of the student handbook, http://cofc.edu/generaldocuments/handbook.pdf). If you have any questions or concerns about honor code expectations or about how to avoid violations, please consult with the instructor.

Plagiarism - Plagiarism is any use of words or ideas produced by another person without proper attribution, and includes failing to paraphrase adequately or to cite sources properly. Plagiarism, both intentional and unintentional, is forbidden by the honor code. Please consult the instructor if you have any questions or concerns about how to use and cite sources to avoid plagiarism.

Collaboration - Many of your assigments will involve working with other students. Nevertheless, the work you submit must be completed independently and must represent your own independent ideas, unless the instructor specifically requires a joint product. Please be sure that you understand the distinction between collaborating and copying; ask your instructor if you have any doubts. Suspicions of unauthorized collaboration will be dealt with according to the honor code.

Re-using work - Please be aware that using work that you or anyone else has done for this or any other class or project, either in whole or in part, is a violation of the honor code, even if the work is revised. Biology 211 instructors keep copies of assignments submitted by students in previous semesters, and reuse or revision of such will result in reporting to the Dean of Students.