Applied Quantitative Methods

College of Charleston, Department of Biology, Spring 2016

Course and Instructor info:

- EVSS 695-01: Special Topics
- Meeting time: 8:30-9:45 am TR; HWWE 305
- Instructor: Dr. Dan McGlinn
- Email: mcglinndj@cofc.edu
- Office: HWWE 203
- Phone: 843-953-0190
- Office hours: 11:20 - 12:20 p.m R or email by an appointment
- Course website: http://dmcglinn.github.io/quant_methods

Course Description:

This course is a three hour seminar for graduate students. The goals of the course are to develop students' knowledge of more advanced and applied topics in statistical analysis, as well as, provide students the opportunity to apply these methods to their own research 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.

Student Learning Objectives:

1. Students will demonstrate an understanding of the theoretical basis of modern quantitative methods such as (but not limited to):
   - R programming
   - Version control
   - Database SQL
   - GIS tools
   - Spatial statistics
   - Multivariate Statistics
2. Students will demonstrate the ability to apply these methods in the development of weekly assignments and a research project.
3. Students will demonstrate the ability to explain different quantitative methods and their application through peer instruction which will include but not be limited to peer interactions in the classroom, posting solutions to the course webpage, providing constructive feedback on peer research projects.
4. Students will demonstrate the ability to develop, analyze, and synthesize results of a research project via a written manuscript and oral research project presentation.

Student Evaluation:

Graduate Students will be evaluated based on the following criteria:

- 5% Participation

- 5% Peer Teaching
- 5% Quizzes
- 40% Assignments
- 45% Project
  - 15% oral presentation
  - 15% project code
  - 15% written description of analysis (e.g., Methods and Results section of a paper)

Project - The project in this course may span a wide range of potential topics and for all students will include an evaluation of contributed code and oral presentation. Graduate students will also contribute a scientific paper on the project topic. More information on the project assignments can be found on the Projects page.

Prerequisites:

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

Course Schedule:

- Jan 11 - Week 01 - Introduction to R
- Jan 18 - Week 02 - Introduction to Version Control and the Terminal
- Jan 25 - Week 03 - Regression and Model Selection
- Feb 01 - Week 04 - Multivariate Models
- Feb 08 - Week 05 - Spatial Models
- Feb 15 - Week 06 - GIS manipulations
- Feb 22 - Week 07 - Simulations and Null models
- Feb 29 - Week 08 - Project Pitch (oral presentation)
- Mar 29 - Week 08 - Work on class project
- Mar 07 - Week 09 - Spring Break (no class)
- Mar 14 - Week 10 - Work on class project
- Mar 21 - Week 11 - Work on class project
- Mar 28 - Week 12 - Work on class project
- Apr 04 - Week 13 - Peer Code Review and Peer Feedback
- Apr 11 - Week 14 - Work on class project
- Apr 18 - Week 15 - Finalize class projects - Code and Written project components due Wednesday Apr 20

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 the appropriate OAKs dropbox. 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%

Typically assignments will be due on Friday morning. Late assignments will be docked 5% per day and will not be accepted after Monday 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 assignments 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.