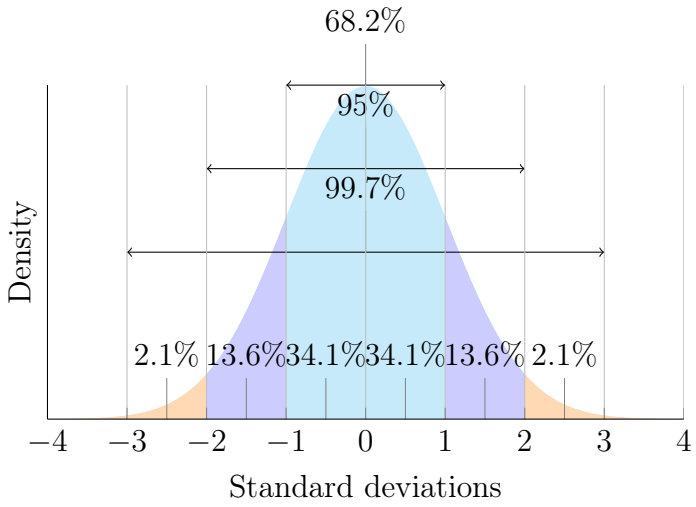
Syllabus Geography 306: Autumn Spring 2014



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1 Course Overview and Objectives

This course is an introduction to quantitative methods for geographic and environmental sciences. Geographers and other environmental and social scientists use quantitative methods, such as statistics, to measure, describe, and make estimates about variables across the landscape for a variety of reasons, such as developing and testing hypotheses or to support decision making. Increasingly large amounts of spatial data are being generated and used by all levels of government as well as by other private and public institutions. Thus, developing solid skills in quantitative analysis should be a priority for any student in these fields.

The main goal of this class is to provide a foundation in the statistical analysis of geographic data. In particular students will:

1. develop an understanding of important theoretical concepts in statistical analysis, and;
2. gain experience in the application of statistics to spatial and other data using specific statistical software.

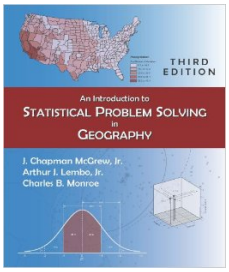
The class covers the fundamentals of statistical analysis including data display, data description and summary, statistical inference and significance tests, analysis of variance, correlation and regression. Students will develop expertise in data analysis using advanced statistical software (the R software environment for statistical computing and graphics). Concepts will be presented and developed through the use of real world data sets that cover both the natural and social environments.

2 Class Organization

The class is divided into lectures (Mon) and a two-hour lab (on Wed). Lectures will cover theoretical material and provide examples of their applied use. The lab period will primarily be involved with learning the practical mechanics of the **R statistical language**.

3 Textbooks

Required text. McGrew, J. Chapman and Charles B. Monroe. (2014). Third Edition. An Introduction to Statistical Problem Solving in Geography, by Waveland Press ISBN: 1-57766-633-X. **Note**: You can get this as an ebook for about half-price from the **Waveland Press, Inc.** website. It is also available from multiple sources online. There is also a much more expensive hardcover edition floating around from McGraw Hill (ISBN: 978-1577666332) that you can use if you can find it more cheaply.



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Now in its third edition, this highly regarded text has firmly established itself as the definitive introduction to geographical statistics. Assuming no reader background in statistics, the authors lay out the proper role of statistical analysis and methods in human and physical geography. They delve into the calculation of descriptive summaries and graphics, the use of inferential statistics as exploratory and descriptive tools, ANOVA and Kruskal-Wallis tests and different spatial statistics to explore geographic patterns, inferential spatial statistics, and spatial autocorrelation and variograms.

The authors maintain an exploratory and investigative approach throughout, providing readers with real-world geographic issues and more than 50 map examples. Concepts are explained clearly and narratively without oversimplification. Each chapter concludes with a list of major goals and objectives. An epilogue offers over 150 geographic situations, inviting students to apply their new statistical skills to solve problems currently affecting our world. The accompanying CD provides data sets for many of the book's examples, appropriate for use with a variety of statistical and GIS software.

Recommended texts and websites. There are many good texts and websites on using R. Two suggested texts are:

1. Verzani, John. (2005). Using R for Introductory Statistics. Chapman & Hall/CRC Press. ISBN: 1-58488-4509. A free and simpler (and older) version of this book is available at: **here**

2. R reference book: An Introduction to R, free download at: http://www.r-project.org/ (click "Manuals"). Simple R: Using R for Introductory Statistics, available **here**.

4 Course Requirements and other Information

- Attendance at all lectures is strongly encouraged though not used in the formulation of your finale grade (as opposed to lab attendance). Students are expected to have completed reading assignments, if any, before class.
- There will be eight labs using R that take place on Fridays. Lab attendance is mandatory. You will not be allowed to turn in a lab assignment for a lab you did not attend (i.e. you cannot make-up the labs on your own time) without permission from the instructors.
- Eight homework assignments will be assigned. Homework will be distributed on ELMS and will be turned in electronically. This may require some scanning of documents for electronic submission. Homework is due at the beginning of lab session and no late work can be accepted.
- There will be two midterms that are non-cumulative. These midterms will take place during the laboratory session times on Wednesday.
- There is a final lab practical exam during the last laboratory session of the semester.
- There will be one "non-cumulative" final. However note well that statistical concepts in this class are inherently cumulative.
- Lab absences, late work and make-up exams are given for University approved excused absences, and students must notify the TA and/or the Instructor and make arrangement at least 24 hours before the due date. Students also need to provide valid documents for absence, late work and make-ups. Otherwise, no late work and make-up requests will be accepted. All requests for absences related to religious observance must be given to the instructor within the first two weeks of class.
- All course communication will take place using ELMS. Please begin the title of all email communication with the text "GEOG306".
- You may bring a laptop/tablet to class, but it may only be used during specified times. Unless otherwise instructed no electronic devices (including phones) may be used.

  The instructor will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide the instructor with a University of Maryland DSS Accommodation form. This form must be presented to the instructor no later than 10/19/2014.

5 Software

The required software for this class is R. R is the open source, freeware version of S (The commercial implementation is Splus). R is one of the most powerful and versatile statistical environments, and is available for free download for use on PC, Mac, UNIX and Linux systems. The software is available in the Lefrak/Geography Open Labs. If you have a laptop or home computer, get this software and download it immediately. There are many variants of the R computing environment (e.g. GUI-based). Please feel free to use whatever version you are most comfortable with on your personal computer. We recommend, however that you use **R Studio**.

6 Grading

The final grade is comprised of five elements:

- homework assignments [35%];
- two midterms, each worth 15% [30%];
- lab attendance [5%];
- lab practical exam [15%];
- and a final exam [15%].

There may be unannounced in-class quizzes. The frequency of these is determined by our ability to stay on top of the required reading and understanding of concepts. Depending on how many are given they could count from 0% - 15% of the course. The weighting of the other elements will be proportionately reduced to achieve a total percentage of 100%. Thus, while class attendance is not mandatory, failure to attend may impact your grade because of missed quizzes.

7 Academic Honesty

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

Note well: Within our class, students may work together on problem sets; however, each student absolutely must turn in their own work, from their own computer, and any discussion must be theirs alone, and not attributable to anyone else. Students must list everyone they collaborated with on each problem set. Students may not use any textual discussion, calculations, scripts or programs from any other student or group of students.