

Applied Spatial Statistics —

Stat 5410, Section 001 / Stat 6410, Section 001, Fall 2015

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Office Hours: MWF 12:00noon – 1:00pm and by appointment.

Classes & Rooms:

MWF 3:30pm – 4:20pm, Mo 8/31 – Fr 12/11, 2015, Library 411.

Please note that there are no classes on Mo 9/7 (Labor Day) and on Fr 10/16 (Fall Break). However, Fr classes will be held on Th 10/15 (i.e., no regular Th classes will be held during that week). There are also no classes during the entire Thanksgiving week (Mo 11/23 – Fr 11/27).

Please visit the course Web page listed above and/or the Canvas page for this course frequently for lecture notes, data sets, R code, etc. — in particular if you miss class for any reason.

Course Objectives:

This class will provide a first insight into applied spatial statistics. We will use a lot of computer software (primarily R and R packages for spatial statistics) and practical examples to provide a basic understanding of existing tools and solutions for spatial statistics.

Prerequisites:

Participants should have statistical knowledge at the Stat 3000 level or above. Working experience with R, similar to the “Introduction to R” course (taught by Dr. Adele Cutler), is strongly recommended. Additional knowledge from the “Advanced R” (also taught by Dr. Adele Cutler) would be a plus. If you do not have this basic proficiency in R, you are strongly asked to attend the “Introduction to R” course concurrently.

IDEA Center Learning Objectives:

Objective 1) Gaining factual knowledge (terminology, classifications, methods, trends).

Objective 2) Learning fundamental principles, generalizations, or theories.

Objective 3) Learning to apply course material (to improve thinking, problem solving, and decisions).

Objective 11) Learning to analyze and critically evaluate ideas, arguments, and points of view.

Topics:

1. Handling spatial data in R (data structures, data import and export).
2. Basic exploration and visualization of spatial data (ESDA).
3. Analysis of spatial data (point patterns, geostatistics, areal data).
4. Others (as time permits).

Quizzes:

There will be a series (4 ± 1) of short quizzes throughout the semester. The length of each quiz will be about 15 to 20min. These quizzes will determine whether you have understood the basic ideas discussed during the previous classes. You may have to interpret the output of some R code, spot the errors in the R code provided to you, or write short segments of R code (often just 1 or 2 lines) that accomplish a particular task. Some quizzes will be closed book/closed computer while in other quizzes, you will have access to R and/or your notes. Quizzes will be announced in class the lecture before an upcoming quiz and this information will also be posted in Canvas. Your lowest quiz score will be dropped. Thus, you can miss one quiz. There will be no makeup quizzes. Quizzes will account for about 30% (Stat 5410) / 20% (Stat 6410) of your final grade.

Homework Assignments:

There will be a series (4 ± 1) of homework assignments throughout the semester. Each assignment will include a value (typically 20–100 points) that it will be scored out of. The value of each assignment will be roughly proportional to its importance and the amount of work involved. Regular homework assignments will be done individually or in groups of 2 or 3 students. This will be specified for each assignment. Homework assignments will account for about 70% (Stat 5410) / 50% (Stat 6410) of your final grade.

Project (Stat 6410 only):

There will be one major project at the end of the semester. The project will be done individually or in groups of 2 or 3 students, depending on the number of students with a suitable spatial data set and the composition of the course with respect to statistics and non–statistics majors. The project will account for about 30% (Stat 6410) of your final grade.

Textbook:

Bivand, R. S., Pebesma, E., Gómez–Rubio, V. (2013), Applied Spatial Data Analysis with R (2nd Edition) [ASDAR], Springer, <http://link.springer.com/book/10.1007/978-1-4614-7618-4/page/1>.

Software:

We will primarily be using R (<http://cran.r-project.org/>), a GNU–license statistical package and clone of S–Plus. Please install the current version of R, i.e., 3.2.2, on your own computer so we can exchange code. R and all R packages we are going to use are available on the web for free download from the URL listed above. For convenience, you should also install RStudio (<https://www.rstudio.com/>).

Credits:

This course uses some of the course materials provided by Dr. Roger Bivand that were prepared in support of his ASDAR textbook. We are likely to include parts from additional web sources that will be specified later on.

Courtesy:

Please turn off pagers and cell phones before class, and please keep conversations to a minimum during lectures. Please do not read/reply to your e–mails or browse other Web pages than the ones discussed during class.

I will not keep track if you come to class or not. However, I would highly recommend to attend all lectures.

Americans with Disabilities Act:

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examination, etc. must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats — large print, audio, diskette or Braille.

Note:

The above schedule and procedures in this course are subject to change in the event of extenuating circumstances.