

**STATISTICS 454/556 Section S01**  
**Spatial Statistics**

**Instructor:** Dr. Farouk Nathoo

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**Lecture Times:** Tuesday, Wednesday and Friday 3:30-4:30

**Office Hours:** Tuesday, Wednesday and Friday 4:30-5:30

**Prerequisite :**

- Stat 556: Any graduate student in statistics or a related discipline who has not taken a similar course may take this course.
- Stat 454: Permission of the instructor - permission will be granted provided you have not taken a similar course, have taken 3<sup>rd</sup> year courses in both mathematical statistics and applied regression analysis. A course in generalized linear models would be very useful; however, not strictly necessary provided you are willing to work hard.

**Textbook:** Hierarchical Modeling and Analysis for Spatial Data; By Sudipto Banerjee, Bradley P. Carlin and Alan E. Gelfand; Chapman and Hall/CRC, 2003.

**Additional Reference:** Statistics for Spatial Data; By Noel Cressie, Wiley, 1993.

**Course Website:** The website for this course is located at:

<http://www.math.uvic.ca/~nathoo/stat556.html>

I will post lecture notes, announcements, homework assignments and datasets on the course website.

**Assessment:** The final grade will be based on the following:

1. Assignments (6 for the term): 60%
  2. Final project: 40%
- The homework in this class is meant to be fairly difficult and time consuming.

- For the final project, students will review a research topic (two to three papers), prepare a written report and give a 25 minute presentation on the topic. I will help each of you choose a topic of interest. The presentation and written report are each worth 20%.
- For purposes of evaluation, graduate students will be held to a higher standard.

**Objectives:**

1. To provide tools for exploring spatial data
2. To provide an introduction to spatial and spatio-temporal modeling from a (primarily) hierarchical Bayes perspective.

**Topics:** We will cover Chapters 1 through 8 of the textbook:

1. Overview of spatial data problems (Chapter 1, 3 lectures)
2. Basics of point referenced data models (Chapter 2, 6 lectures)
3. Basics of areal data models (Chapter 3, 3 lectures)
4. Basics of Bayesian inference (Chapter 4, 3 lectures)
5. Hierarchical Modeling for univariate spatial data (Chapter 5, 6 lectures)
6. Spatial misalignment (Chapter 6, 3 lectures)
7. Multivariate spatial modeling (Chapter 7, 6 lectures)
8. Spatio-temporal modeling (Chapter 8, 6 lectures)

**Computing:** R, Winbugs and perhaps some programming in C.

**Commitment to Inclusivity and Diversity:** The Resource Centre for Students with a Disability ([www.resd.uvic.ca](http://www.resd.uvic.ca)) offers support for students with a permanent disability upon enrollment. Students who experience academic requirements in conflict with religious holy days should make prior arrangements with me to alleviate these conflicts. All participants are expected to provide a supportive and safe learning environment for all class members.