I. Course Objective
Ecological processes are inherently spatially distributed due to spatial dependence to environmental conditions and spatial autocorrelation of species behaviors. The goal of this course is to provide a broad overview of the various spatial analytical methods available to quantify (geostatistics, network theory, boundary detection), test (restricted randomization) and model (spatial regressions) spatially autocorrelated ecological data. Students will be introduced to concepts of spatial scales and how multiscale analysis can be performed with census and sampled data. Furthermore specific spatial methods to deal with point pattern data and surface pattern data will be reviewed. A combination of lectures and computer laboratory sessions will be used.

II. Tentative Schedule

<table>
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<th>WEEK</th>
<th>TOPICS</th>
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| Week-1 Sept. 5/2014 | Introduction to the course  
Randomization tests  
R101 |
| Week-2 Sept. 12/2014 | Spatial autocorrelation for population data; Join count statistics  
Spatial autocorrelation for sample data (global statistics)  
Lab exercise: Spatial autocorrelation |
| Week-3 Sept. 19/2014 | Interpolation  
Spatial autocorrelation for sample data (local statistics)  
Lab report: Spatial autocorrelation DUE |
| Week-4 Sept. 26/2014 | Relationship between spatially autocorrelated variables (Mantel test)  
Spatial regressions (CAR, SAR, GWR, CART, autologistic, etc.)  
Lab exercise: Spatial regression |
| Week-5 Oct. 3/2014 | Graph theory  
Spatio-temporal graphs  
Boundary detection |
| Week-6 Oct. 10/2014 | Spatio-temporal analysis  
Multiscale analysis (MEM, wavelet)  
Lab report: Spatial regression DUE |
| Week 7 Oct. 17/2014 | Student presentations |

III. Assignments and Evaluation
- Two assignments/labs using R: one on spatial autocorrelation and one on spatial regression (20% each, for a total of 40%).
- Write the “methods section” of your data analysis which presents appropriate statistics you should use to answer your hypotheses/objectives. Maximum 5 pages including half-page presenting the hypotheses/objectives and half-page presenting the data collection (45% of final mark).
Each student should present (5-minute presentation) their hypotheses, data and the methods selected and why they are the appropriate methods (15% of final mark).

IV. Textbook

V. Other References