GEOG 696C Spatiotemporal Data Analysis
Autumn 2016

## Locations and Times

Tuesday and Thursday, 11:00AM to 12:15PM
ENR2, Room S547

## Instructor Information

Kevin Anchukaitis
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Office Hours: Monday, 3pm to 5pm, ENR2 S514 or by appointment
All communications concerning class are via official UA email addresses.

Course materials online via D2L (http://d2l.arizona.edu)

This is a tentative course schedule and subject to change.

This course is designed as a graduate level 'workshop' to give students practical experience, knowledge, and statistical tools for analyzing spatiotemporal datasets. Topics include basic matrix algebra, exploratory data analysis, field correlation and regression analysis, autocorrelation and its statistical consequences in time and space, parametric and non-parametric significance testing and error analysis, empirical orthogonal functions including rotation, singular spectrum analysis, maximum covariance and canonical correspondence analysis, and traditional and multitaper spectral analysis. The course encompasses practical instruction and training in MATLAB and in the use and manipulation of large multi-dimensional datasets.

The major assignment and outcome for the class (60% of the grade) will be an analysis of a substantial space-time dataset and the oral presentation of the results. Graduate students are encouraged to bring with them or seek out data relevant to their research to use for their final project. Ideally, final projects may provide the material for a thesis chapter or other peer-reviewed article.

**Tentative Course Outline**

| Week | Content |
|---|---|
| Week 1 | Data, observations, and uncertainties<br>Introduction to MATLAB and large dataset formats and conventions |
| Week 2 | Introduction to matrix algebra<br>Covariance, autocovariance, trends, and uncertainty |
| Week 3 | Empirical orthogonal functions |
| Week 4 | Empirical orthogonal functions, rotation, significance testing |
| Week 5 | Canonical correlation analysis and Maximum covariance analysis |
| Week 6 | spatial correlation and regression<br>field significance and spurious relationships |
| Week 7 | spectral analysis |
| Week 8 | spectral analysis, significance testing, and uncertainty |
| Week 9 | Time uncertainty in spatiotemporal data analysis |
| Week 10 | Multivariate regression, calibration, and validation |
| Week 11 | Guided student project work |
| Week 12 | Guided student project work |
| Week 13 | Student presentations |
| Week 14 | Student presentations and summary |