CLIM762: Statistical Methods in Climate Research, Spring 2020

Instructor: Timothy DelSole (**Email**: tdelsole at gmu dot edu)
Office Locations and Phone Number: Research Hall Rm112 (703-993-5715)
Office Hours: By appointment (request made by email).
Catalogue Description: Introduction to a core set of statistical methods that have proven useful to modern climate and predictability research. Topics include hypothesis testing, autoregression models, analysis of variance, statistical forecasting, linear regression, cross validation, principal component analysis, detection and attribution of climate change.
Prerequisites: linear algebra, programming experience, STAT 344; or permission of instructor.
Class Meeting: Mondays, 4:30-7:10pm, Research Hall, Rm 121
Grading: Homework: 50%, Exam: 25%, Project: 15%, Written Comments Prior to Class: 10%.
Policy: Homework assignments will be distributed on Monday and are due in class the following Monday. Late assignments will be penalized one letter grade per day late (exceptions for medical reasons).
Honor System: About 90% of the homeworks were given in previous years. Students are expected to refrain from consulting answers for previous years' homeworks.
Class Web Site: Blackboard
Course Text There is no official text book for this course. Lecture notes will be made available electronically before each lecture. The following texts may prove useful:
Probability and Statistics, by Spiegel, Schaums Outlines (**highly recommended**).
Applied Multivariate Statistical Analysis, by Johnson and Wichern.
Software Homework computations are expected to be done using the package **R**.

Class Schedule

01/27	Probability concepts
02/03	Hypothesis tests
02/10	Confidence Intervals
02/17	Hypothesis Tests based on Ranks
02/24	Stochastic Processes
03/02	Power spectra
03/09	**Spring Break**
03/16	**Cancelled due to Coronavirus**
03/23	Multivariate Concepts
03/30	Linear regression: estimation
04/06	Linear regression: inferences
04/13	Principal Component Analysis
04/20	Model selection
04/27	FINAL EXAM (take-home; closed book; honor system)
05/04	review final exam
05/11	Pitfalls of Statistical Inference
05/18	Class Presentations

Project Each student will choose an original research question. Examples of suitable research questions will be given by instructor during the semester. Student should submit a proposal describing the research question to the instructor on April 29, 2020. Students are strongly encouraged to discuss the project idea with instructor before submitting proposal. Instructor will notify student of the appropriateness of the proposal by May 1, 2020. Student will address the question with appropriate statistical analysis. Student will present the results orally to the other students in a 15 minute presentation on May 18, 2020. Presentation slides will be submitted to the instructor immediately after all presentations.