## Class meets: MWF 11 - 11:50 AM NWC 5720

**Professor**: Michael Richman; **Office**: 5646; **Office hours**: MWF 12:00 – 1:00 PM or by scheduled appointment **Contact points**: Can be reached by phone: 5-1853 or by email: <u>mrichman@ou.edu</u> Feel free to Email me to schedule a meeting or to Email after office hours (but before midnight, if you want a quick turnaround)

## Philosophy behind the course:

This course is designed to teach the interplay between statistics and meteorology. In order to understand how data are analyzed and those analyses are interpreted, I will present lectures outlined in the second page of the syllabus. The relevance to the atmosphere will be examined through use of meteorological data sets. There is a large amount of material in this class. Consider that statistics is a field of study, just like meteorology. The average meteorology student in the SoM takes a minimum of 14 meteorology classes and a single statistics class. The average statistics student takes about 10 statistics classes and two science classes to satisfy her or his general education requirements. To present a small portion of what a statistics major would take, this class is presented at a brisk pace. *If you don't understand something in lecture, ask a question during class!* I enjoy answering questions. Otherwise, contact me immediately after class, so you do not fall behind. Owing to the amount of material, I don't have the luxury of using homework as a practice for tests. By computing with Splus or R, the homework gives you a new tool and skill set, making you more employable or better preparing you for graduate school. Homework is designed to reinforce concepts in the lectures by giving you practice at coding up the concepts. If you don't see the link between homework and the lectures, see me. Tests reflect concepts stressed in the lectures and there is no computer coding on tests. *If you want to get the most out of the class, put in some time on the homework and study the lecture material for the tests.* 

## Course work & Grading Policies

**Books and Handouts:** Lecture notes covering the presentations will be distributed and posted to D2L. **Book Required:** Wilks, Daniel, 2011: Statistical Methods in the Atmospheric Sciences. Third Edition. ISBN: 0123850223. *Optional*: Spector, Phil: 1994: An Introduction to S and Splus. ISBN: 0-534-19866-X [also 1 copy available in Bizzell Library] Free Splus primer: Spectry is on D2L under the Metr 4313 "content" tab [*Do NOT print on any SOM printer as it is >400 pp*]

**Homework**: Assigned at least a week prior to due date. Use a Word processor to do all homework and *staple it*. Late assignments penalty: 50% (if fewer than 7 days late). I am always available to give advice on homework – see or Email me.

**Tests**: There are three semester tests and a final (Thurs. Dec. 11 at 1:30 - 3:30 PM). The lowest semester test grade is dropped.

**Computing**: All students who do not have a School of Meteorology (SoM) computer account should obtain one from Mark Laufersweiler. Course work will be reinforced by application of real meteorological data sets using the Splus statistical/ mathematical package. This is available on any of the Metlab Workstations. A free version is available for Windoze machines. Those with Macs have three options: (1) Purchase Parallels Desktop for *\$25* from the ItStore – under "Apple Software" (https://itstore.ou.edu) and run Splus, (2) Run a Windows Virtual Box (*free* from Oracle <a href="https://www.virtualbox.org/">https://www.virtualbox.org/</a>) and run Splus or, (3) Use the "R" statistical package (*free* at <a href="http://www.r-project.org/">http://www.r-project.org/</a>) as there is an R binary for Macs. Splus and R are very similar, but Splus is fully supported and more user friendly whereas R is open source. The optional text by Spector and the free web link primer (Spoetry see D2L "content") have good introductory material on the use of Splus. Data sets will be available online for testing statistical methods and for homework. I will make myself available for help with Splus/R.

Student feedback and participation: Students are expected to participate actively in a professional manner. In class, students are encouraged to ask questions. *Note that there is a grade for participation that reflects your interaction with others in the class and for asking questions.* 

Graduate students: A research paper is due the day of the final exam. See me within the first month about your topic.

**Grades**: Grade percentages will be constructed as shown below. There is almost always a curve in this class. Please don't ask me "how much is the curve" because that is impossible to assess until the grades are in.

Undergraduate	Students	Graduate Students	Graduate Students	
Homework:	25%	Homework: 20%	%	
Tests:	45%	Tests: 30%	⁄0	
Final:	25%	Final: 25%	%	
Participation:	5%	Participation: 5%	⁄0	
		Research Paper: 20%	<mark>%</mark>	

Syllabus: (next, page, turn over)

8/18       Introduction of data, frequency measures       3         8/20       Organization of data, frequency measures       3         8/21       Variability, higher-order moments       5         8/27       Variability, higher-order moments       5         8/29       Higher-order moments, graphical devices       5         8/20       Organization of the properties of the properis of the properties of the properies of the properime o	Date	<u>Topic</u>	<b>Book Chapter in Wilks</b>
8/20     Organization of data, frequency measures     3       8/22     Outliers, outliars, measures of location     8       8/25     Variability, higher-order moments     8       8/27     Wariability, higher-order moments     8       8/28     Higher-order moments, graphical devices     9       9/03     Graphical devices and reexpression     9       9/03     Graphical devices and reexpression     9       9/04     Forecast verification issues     7       9/15     Test I     7       9/16     Proceast verification issues     2       9/17     Probability     2       9/18     Correlations, lag correlations     9       9/21     Forecast verification issues     4       9/22     Conditional Probability     2       9/18     Test I     9       9/20     Conditional Probability, independence     4       9/24     Bayes' Theorem derived and applications     4       9/29     Introduction to the bootstrap     4       10/01     Uniform distributions     4       10/03     Normal distributions     4       10/04     Normal distributions     5       10/10     No class – OU/TX Travel Day     1       10/11     Sampling distributions and Bernoulli	8/18	Introduction	1
8/22       Outliers, outliars, measures of location         8/23       Variability, higher-order moments         8/27       Variability, higher-order moments         8/28       Higher-order moments, graphical devices         9/10       No Class – Labor Day         9/03       Graphical devices and reexpression         9/04       Correlations, lag correlations         9/10       Forecast verification issues         9/11       Forecast verification issues         9/12       Forecast verification issues         9/13       Conditional Probability, independence         9/14       Roykeys' Theorem derived and applications         9/24       Bayes' Theorem derived and applications         9/25       Introduction to the bootstrap         10/01       Uniform distributions         10/02       Normal distributions         10/03       Normal distributions         10/04       Normal distributions         10/05       Sampling distributions - variances         10/15       Sampling distributions - variances         10/16       Meteorological applications (gamma distribution, other distributions)         10/24       Law of Averages and Central Limit Theorem         10/25       Application of the bootstrap to sample estimation	8/20	Organization of data, frequency measures	3
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