Metr 4313-001 **Statistical Meteorology** **Metr 5313-001**

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: mrichman@ou.edu
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: Spoetry 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 https://www.virtualbox.org/) and run Splus or, (3) Use the "R" statistical package (***free*** at http://www.r-project.org/) 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	
Homework:	25%
Tests:	45%
Final:	25%
Participation:	5%

Graduate Students	
Homework:	20%
Tests:	30%
Final:	25%
Participation:	5%
Research Paper:	20%

Syllabus: (*next, page, turn over*) →

Date	Topic	Book Chapter in Wilks
8/18	Introduction	**1**
8/20	Organization of data, frequency measures	**3**
8/22	Outliers, outliars, measures of location	
8/25	Variability measures	
8/27	Variability, higher-order moments	
8/29	Higher-order moments, graphical devices	
9/01	No class – Labor Day	
9/03	Graphical devices and reexpression	
9/05	Association between two variables, scatterplots	
9/08	Correlations, lag correlations	
9/10	Forecast verification	**7.1,7.2**
9/12	Forecast verification issues	
9/15	**Test 1**	
9/17	Probability	**2**
9/19	Conditional Probability	
9/22	Conditional Probability, independence	
9/24	Bayes' Theorem derived and applications	
9/26	Probability distributions, sampling ideas	**4**
9/29	Introduction to the bootstrap	
10/01	Uniform distributions	
10/03	Normal distributions	
10/06	Normal distributions	
10/08	Sampling distributions	
10/10	No class – OU/TX Travel Day	
10/13	Sampling distribution ideas	
10/15	Sampling distributions - means	
10/17	Sampling distributions - variances	
10/20	Binomial distributions and Bernoulli trials	
10/22	**Test 2**	
10/24	Law of Averages and Central Limit Theorem	
10/27	Sample estimation	
10/29	Application of the bootstrap to sample estimation	
10/11	Meteorological applications (binomial, geometric and Poisson distributions)	BOO!
11/03	Meteorological applications (gamma distribution, other distributions)	
11/05	Chi-square tests	
11/07	Confidence intervals on means with known standard deviations	**5**
11/10	Confidence intervals on means with unknown standard deviation	
11/12	Confidence intervals on medians, paired measurements	
11/14	Hypothesis testing	
11/17	Hypothesis testing	
11/19	Errors and power	
11/21	Power curves, p-values	
11/24	**Test 3**	
11/26	No class - Thanksgiving	
11/28	No class – Thanksgiving	**6**
12/01	Univariate regression and diagnostics	
12/03	Multiple regression	
12/05	Stepwise regression	
12/11	**Scheduled final exam – 1:30 am – 3:30 PM**	

Reasonable Accommodation Policy: "The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or fax only 405/325-4173." **See** http://www.ou.edu/drc/home/students/policies.html **for more details.**

Academic Misconduct Policy: "All students are expected to be familiar with and abide by the OU Academic Misconduct Code. Each student should acquaint him or her self with the University's codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on physical handicap." **See http://integrity.ou.edu/ for the OU integrity site and http://integrity.ou.edu/files/Academic_Misconduct_Code.pdf for the entire OU Academic Code.**