

## Metr 5313-001

## Statistical Meteorology

**Class meets:** MWF 11 – 11:50 AM NWC 5720

**Professor:** Dr. Michael Richman

**Office:** 5646; **Office hours:** MWF 12:00 – 1:00 or by scheduled appointment

**Contact points:** Can be reached by phone: 5-1853 or by email: [mrichman@ou.edu](mailto:mrichman@ou.edu)

### ***Philosophy behind the course:***

This course is designed to illustrate the interplay between statistics and meteorology. In order to understand how experiments are designed and analyzed, you will learn theory of descriptive statistics, a brief overview of probability and probability distributions, inferential statistics, and regression. The relevance to the atmosphere will be examined through use of meteorological data sets.

### ***Course work & Grading Policies***

#### **Books:**

**Required:** (1) 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% ( fewer than 7 days late)

**Tests:** There are two semester tests and a final (Fri. Dec. 14 at 1:30 – 3:30 PM).

**Handouts:** Lecture notes covering the presentations will be distributed and posted to D2L.

**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>), (2) Run a Windows Virtual Box (*free* from Oracle <https://www.virtualbox.org/>) or, (3) Use the “R” statistical package (*free* at <http://www.r-project.org/>). 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 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.*

**Final Project:** A final course project will be required in addition to the regular class work and homework. Please see instructor *within the first 30 days* to get advice on an appropriate topic. Work related to your thesis is encouraged.

**Grades:** Grade percentages will be constructed as shown below.

#### Graduates

Homework:	20%
Test 1 & 2:	15% each (30%)
Final:	25%
Participation:	5%
Project	20%

<u>Date</u>	<u>Topic</u>	<u>Book Chapter in Wilks</u>
8/20	Introduction	1
8/22	Organization of data, Location	3
8/24	Location measures, outliers	
8/27	Variability	
8/29	Variability, higher-order moments, graphical devices	
8/31	Higher-order moments	
9/03	No class – Labor Day	
9/05	Graphical devices and reexpression	
9/07	Association between two variables	
9/10	Multivariate association	
9/12	Frequency tables	
9/14	Forecast verification issues	7.1, 7.2
9/17	Test 1	
9/19	Probability	2
9/21	Probability	
9/24	Conditional Probability	
9/26	Independence and Randomness	
9/28	Bayes' Theorem	
10/01	Probability Distributions	
10/03	Probability Distributions	4
10/05	Uniform distributions	
10/08	Normal distributions	
10/10	Sampling from a population	
10/12	No class – OU/TX Travel Day	
10/15	Discrete distributions	
10/17	Continuous distributions	
10/19	Continuous distributions	
10/22	Normal Distribution of sample means	
10/24	Normal distribution of sample means	
10/26	Test 2	
10/29	Sample estimation	5
10/31	Sample estimation	
11/02	Paired measurements & matched samples	
11/05	Paired measurements & matched samples	
11/07	Hypothesis testing about a mean	
11/09	Errors & power	
11/12	Hypothesis testing with unknown standard deviation	
11/14	P-values	
11/16	P-values	
11/19	Paired measurements	
11/21	No class – Thanksgiving	
11/23	No class – Thanksgiving	
11/26	Differences between populations	
11/28	T-tests	
11/30	Regression	6
12/03	Regression	
12/05	Regression	
12/07	Regression	
12/14	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](http://integrity.ou.edu/files/Academic_Misconduct_Code.pdf) for the entire OU Academic Code.