

## Meteorology 4613/5803: Fundamentals of Satellite Meteorology Fall 2010

When: MWF 10:00-10:50AM

Where: NWC 5600

Who: Dr. Mark Morrissey

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Office hours: By appointment until things are sorted out

### COURSE DESCRIPTION

Satellite Meteorology introduces both the undergraduate and the graduate student to the current use of satellites to study weather and climate and the underlying **mechanics** and **physics** related to variable measurement. Material presented includes the history of satellites, orbital dynamics (Newton and Kepler's Laws, etc.), radiation concepts (as related to satellites), algorithms, etc. See the Knowledge Expectations for a detailed description of course content.

Near the end of the semester, each graduate student will be required to give a short 15 minute presentation in class related to the satellite meteorology. The presentation will be basically a review of a journal article selected by the student. It is advisable that the journal article not be too difficult or too technical (unless the student fully understands the content). Grading of the presentation will be a function of the work involved in the preparing and presenting. The purpose of the presentation is to get the class involved in discussing the article topic.

Note: The course relies heavily on an understanding of certain basic mathematics (i.e. trigonometry and vector calculus) and the physical concepts of radiation related to the atmospheric and remote sensing. While satellite image interpretation is taught in one section it is by no means the primary focus in this course. This course is offered once a year in our department, to those of you who are planning to become forecasting or research meteorologists (among other related profession), the use of satellite information will become extreme critical in your job.

Required Text: *Satellite Meteorology: An Introduction* by Kidder and Vonder Haar

HIGHLY Recommended book: *Fundamentals of Astrodynamics*, by Bate, Mueller and White  
(It's relatively cheap ~ \$17)

Grading: Mid-term (30%), Final Exam (comprehensive 40%), Homework (30%). Final Exam:  
8:00-10:00AM Monday, December 14<sup>th</sup>.

**If you miss class you need to borrow notes from classmates**

Course Outline (subject to change, student presentation after each topic, roughly one student per topic until all students have one presentation):

1. Brief history of satellite meteorology

2. Orbital dynamics and navigation (3 weeks)

Goal: Learn the kinematics and dynamics of orbits. Understand commonly used satellite terms. Will complete discussion when orbital velocity is related to orbital geometric elements

3. Radiative transfer (2 weeks)

Goal: Understand basic radiation concepts, especially those related to satellite use in meteorology/climatology.

4. Image interpretation (1 week)

Goal: Learn subject techniques of identifying weather system characteristics from satellite images.

5. Temperature and trace gases measurement (2 weeks)

Goal: Learn how the vertical atmospheric temperature (gas distribution) structure is obtained from measurements from downward looking satellites.

6. Winds (1 week)

Goal. Learn how surface and upper levels winds are obtained from satellite measurements.

7. Precipitation (2 weeks)

Goal: Learn how satellite precipitation algorithm work.

8. Forecasting using satellite data (remaining time prior to student presentations)

Goal: Survey of various methods used to forecast movement, intensification, etc. of weather systems from satellites.

## **IMPORTANT POLICIES:**

**Reasonable Accommodation:** *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.*

**Academic Misconduct:** All provisions of the Norman Campus Academic Misconduct Code shall apply in cases of academic dishonesty. Any violation of the Academic Misconduct Code will result in your removal from this course, and a grade of F will be recorded for the course. Academic misconduct is defined as “any act that improperly affects the evaluation of a student’s academic performance or achievement.” At the University of Oklahoma, academic integrity is expected from each student. Misconduct such as plagiarism, fabrication, and fraud, as well as attempting to commit such acts or assisting others in doing so, will not be tolerated. Students are responsible for knowing the OU Academic Conduct Code, which can be found at <http://www.ou.edu/studentcode> and <http://www.ou.edu/provost/integrity>