Atmospheric Sciences: Atmospheric Remote Sensing 666
T Th 2pm-3:30pm in TBD

Instructor:	Prof. Kenneth Sassen		
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Phone:	474-7845	Fax:	474-7290
Office Hours:	T Th 3:00-5:00 PM, IARC 301		
	W 1:30-4:30 PM, IARC 301, and by appointment		
Text:	Radar Observation of the Atmosphere, by L. J. Battan		

Course Overview:
In this class you will receive the fundamentals of what and how can be learned about the atmosphere through modern remote sensing techniques. We will concentrate on active remote sensing using radar and lidar and on combinations of active and passive remote sensors to study the properties of clouds and aerosols, but other research methods like aircraft in situ sampling will be included. This course complements Cloud Physics, because many of the modern approaches to studying clouds and aerosols are based on remote sensing techniques. When interesting weather conditions occur, we will have 'field trips' to the roof of the Elvey Building to collect data at the Arctic Facility for Atmospheric Remote Sensing (AFARS). Although no single text covers this broad range of topics, Battan's time-proven book is a good starting point, and will be supplemented recent reports and publications.

Grading:
Your grade will be determined by your combined scores on two one-hour exams, a two-hour final exam, and a homework assignment. The point breakdown is given below:

2 hour-long exams (100 points each)	200 points
Final exam (Tentatively 5/9)	200 points
Homework/Term paper	100 points
Total	500 points

The tentative grade scale is as follows:

435-500 points	A
380-434.9 points	B
325-379.9 points	C
270-324.9 points	D
<269.9 points	F

The grades may be curved, but if you get the lowest number in the range listed above, you will receive at least that grade.

Exams and Homework:
The two exams during the semester are an hour in length and are on the new information presented during the weeks before. The final exam is two hours long and is cumulative. I do give partial credit, so it is to your advantage to let me know your reasoning. Late make-up exams and homework will be allowed if prior arrangements are made with the professor. The student is responsible for obtaining the class notes from missed lesions or tardiness in attendance.

For homework I will ask for a combination of occasional assignments and a 10-12 (double-spaced) page research paper giving a detailed account of a remote sensing research topic of your choice. You will provide the background of your topic through a comprehensive literature search, describe the instrument design and theory, and review how the data has added to our knowledge of the atmosphere. So, keep you eyes open for a topic of interest during the semester. The paper will be due one week before the end of classes, but can be submitted at any time.

<u>Ethics:</u>
Do not cheat on your exams or plagiarize your paper- you are only cheating yourself. Any student turning in a paper not written by him/herself (such as copied from the Internet or purchased from a company) will flunk the entire course.

<u>Disabilities:</u>
Students with documented disabilities who may need reasonable academic accommodations should discuss these with me during the first two weeks of class. You will need to provide documentation of your disability to Disability Services in the Center for Health and Counseling, 474-7043, TTY 474-7045.

<u>Schedule:</u>

Lesson Number	Topic
1	Course Outline and Fundamentals
2	Properties of Electromagnetic Waves
3	Principles and Designs of Remote Sensors
4	Propagation of Electromagnetic Waves: Refraction and molecular attenuation
5	The Basic 'Radar' Equation
6, 7	Backscattering and Attenuation from Spherical Particles
8, 9	Backscattering and Attenuation from Nonspherical Particles
10	Backscattering and Attenuation from Inhomogeneous Particles
11	First Exam
12, 13	Meteorological Applications: Cloud Physics Research
14	The Bright and Dark Bands (Sassen and Chen 1995)
15	NEXRAD Radar Applications (NWS)
16, 17	Overview of Remote Sensing Techniques
18, 19	The Multiple Remote Sensor Approach (Sassen 1984)
20	Second Exam
21, 22	Cirrus (Sassen and Mace 2001)
23	Field Trip to AFARS for Data Collection
24	Stratus Clouds (Sassen et al. 1999)
25	Mixed-Phase Clouds
26	Aerosols and Cloud Interactions (Sassen 2001)
27	Convective Systems, Hail and Rainfall
28	Field Trip to AFARS for Data Collection
29, 30	Review for Final

<u>Important Dates:</u>

1/20	First day of class
2/4	Drop Day
3/25	Last Day for Withdrawls
5/6	Last Day of Classes
9 – 12 May	Final Exam Week