

**EAS 41700/B9025 Satellite Meteorology
Spring 2019**

Instructor: Prof. Johnny Luo, Office: MR-927, 212-650-8936, zluo@ccny.cuny.edu;
Time: M/W 9:30 -10:45; **Location:** MR044;
Office hours: after class or by appointment

Description: Satellites have become an increasingly important tool for studying and monitoring the Earth's weather and climate. This class will introduce to the students a vibrant, new branch of the Atmospheric Science – Satellite Meteorology. The following subjects will be covered: 1) orbits of meteorological satellites, 2) instruments they carry, 3) fundamentals of atmospheric radiation and remote sensing, 4) meteorological parameters that can be retrieved from satellites, and 5) some selected applications. In addition, we will learn how to use Matlab to access, display and analyze satellite data.

Prerequisites: Math 201, 202 and 203, General Physics 207-208. Programming experience (e.g., Matlab) is highly desirable.

Textbooks:

(Main text) *Satellite Meteorology: An Introduction*, by Stanley Q. Kidder and Thomas H. Vonder Haar, Academic Press, 466pp

(Supplementary text) *Remote Sensing of the Lower Atmosphere: An Introduction* by G. L. Stephens, Oxford Press, 523pp

Grading:

	Undergrad	Graduate
Homework	10%	10%
In-class tests	30%	30%
Final Project	30%	40%
Final Exam	30%	20%

Course Objectives:

1. Describe physical laws governing satellite orbits and list various orbits of the meteorological satellites;
2. Understand fundamentals of atmospheric radiation and remote sensing;
3. Be able to interpret meteorological satellite images including visible, IR and microwave images;
4. Understand satellite retrievals of meteorological parameters especially cloud parameters.
5. Get familiarized with accessing and analyzing NASA satellite data

Course Outline:

(Note: weekly plan may be subject to small changes)

Week	Dates	EAS417 Sat Met	Notes
Week 1	Jan 28	Introduction	
	Jan 30	Satellite orbits & navigation I	
Week 2	Feb 4	Satellite orbits & navigation II	
	Feb 6	Satellite orbits & navigation III	
Week 3	Feb 11	Satellite orbits & navigation IV	
	Feb 13	Atmospheric radiation I: BB radiation, & gaseous absorption	
Week 4	Feb 18	No Class (Presidents' Day)	
	Feb 20	In-class Lab 1: Matlab tutorial	
Week 5	Feb 25	Test 1	15 pts
	Feb 27	Atmospheric radiation II: Gaseous absorption & dielectric materials	
Week 6	Mar 4	Atmospheric radiation III: Particle scattering	
	Mar 6	Atmospheric RS I: absorption-scattering	
Week 7	Mar 11	In-class Lab 2: access and analyze satellite data I (MODIS)	
	Mar 13	Atmospheric RS II: absorption-emission	
Week 8	Mar 18	Atmospheric RS III: radar & lidar	
	Mar 20	Atmospheric RS IV: radar & lidar	
Week 9	Mar 25	In-class Lab 3: access and analyze satellites data, II (CloudSat)	
	Mar 27	Test 2	15 pts
Week 10	Apr 1	Meteorological satellites & instrumentation I	
	Apr 3	Meteorological satellites & instrumentation II	
Week 11	Apr 8	Satellite image interpretation I	
	Apr 10	Satellite image interpretation II	
Week 12	Apr 15	In-class Lab 4: cloud image analysis	
	Apr 17	Class project update presentation	(Undergrad) 10 pts; (Graduate) 10 pts
Week 13	Apr 22	No class (Spring Break)	
	Apr 24	No class (Spring Break)	
Week 14	Apr 29	Satellite data in weather forecasting & climate prediction I	
	May 1	Satellite data in weather forecasting & climate prediction II	
Week 15	May 6	Preparation for final presentation	
	May 8	Student Presentation I	(Undergrad) 20 pts; (Graduate) 30 pts
Week 16	May 13	Student Presentation II	