2022FA - REM SENS OCN ATMOS (11:670:451 & 16:712:552)

Remote Sensing of the Atmosphere and Ocean (11:670:451/16:712:552)

Fall 2022 - Class meets 2:00 PM to 3:20 PM

Class website: **Canvas**

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Learning Goals for This Course

- Develop a basic understanding of the types and applications of remote sensor technology used in Atmospheric and Oceanic Science.
- Develop specific understanding of the radar and satellite remote sensors used to conduct a weather discussion of mesoscale and synoptic weather systems, and ocean state.
- Develop specific understanding of the physical principles used to remotely sense atmospheric and oceanic structure.
- Exhibit critical thinking when confronting new information.
- Communicate clearly orally and in writing, including by electronic means.

Class #	Date	Day	Topic	Lecturer
1	9/6	T	Course Introduction Orbits and Scan Geometry 1	All J. Wilkin
2	9/8	Th	Orbits and Scan Geometry 2	J. Wilkin
3	9/13	T	Infrared Sea Surface Temperature and Ocean Color	J. Wilkin
4	9/15	Th	Ocean Surface Salinity	J. Wilkin

5	9/22	T	Electromagnetic Radiation 1	J. Miller
6	9/24	Th	Remote Sensing Tutorials (https://www.nrcan.gc.ca/maps-tools-and-publications/satellite-imagery-and-air-photos/tutorial-fundamentals-remote-sensing/9309) Electromagnetic Radiation II Fundamentals of Remote Sensing Plank's Blackbody Equation (Shortwave and longwave limits, Wien's Law, Stefan-Boltzmann Law) Radiative transfer equation (RTE, Absorption only, Beer's Law)	J. Miller
7	9/27	T	Vertical Soundings I/Temperature Profiles Chahine paper (handout in class)	J. Miller
8	9/29	T	Vertical Soundings II (ozone, water vapor, gases) Earth Radiation Budget (slides)	J. Miller
9	10/4	T	NASA: Climate and Earth Energy Budget ERBE(sensors/cloud radiative forcing)	J. Miller
10	10/6	Th	Climate and climate change applications	J. Miller
11	10/11	T	Satellite Applications: Synoptic Meteorology Satellite Applications for Weather	M. Miller

12	10/13	Th	Weather Radar I: Radar Equation and Basics **Radar Basics**	M. Miller
13	10/18	T	Weather Radar II: Scattering / Propagation **Radar Basics**	M. Miller
14	10/20	Th	**EXAM 1**	
15	10/25	T	**Ocean Vector Winds**	J. Wilkin
16	10/27	Th	**HF-radar for ocean current (CODAR)**	J. Wilkin
17	11/1	T	**Altimetry I**	J. Wilkin
18	11/3	Th	**Altimetry II**	J. Wilkin
19	11/8	T	Weather Radar III: Brightband and Propagation **Radar Basics**	M. Miller
20	11/10	Th	Weather Radar IV: WSR-88D and Doppler **Radar Basics**	M. Miller
21	11/15	T	Weather Radar V: Polarization and Wind Profilers / RASS **Radar Basics**	M. Miller
22	11/17	Th	Finish Weather Radar / Climate Radars / Lidars **Radar Basics**	M. Miller
23	11/22	T	**EXAM 2**	
▶	11/29	T	Orbiting Carbon Observatory and Biosensors	M. Miller
			Remote Sensing of the Cryosphere (take home assessment)	
25	12/1	Th	**Cryosphere (Sea ice)** ↓ **(https://rutgers.instructure.com/courses/71844/files/13293493/download?download_frd=1)** J. Miller	M. Miller
26	12/6	T	STUDENT PROJECT PRESENTATIONS	

27	12/8	Th	STUDENT PROJECT PRESENTATIONS
28	12/13	T	STUDENT PROJECT PRESENTATIONS

Grading:

Weighting: Homework (35%), Exams (40%), Term Project (25%)