SIOC 251: Radiation the Atmosphere

Spring Quarter 2021
9:30-10:50, Tuesday and Thursday
Spiess 330 or online (zoom links can be found on the canvas site)

Instructor

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Office hours

Tuesday immediately after class or by appointment.

Course description

This graduate level core course in radiation provides an introduction to basic laws, radiative transfer under clear sky conditions, scattering by individual particles, multiple scattering, radiative properties of clouds and aerosols, and techniques to solve the radiative transfer equation.

Required textbook

A First Course in Atmospheric Radiation (2nd Ed.)
Grant W. Petty
Sundog Publishing, LLC

You can purchase the textbook from Amazon (http://tinyurl.com/ofhqh3g (Links to an external site.)) or directly from the publisher (https://tinyurl.com/ngcj9z98 (Links to an external site.)), or you can purchase the e-book version at the Apple Store (https://tinyurl.com/wy9a829y (Links to an external site.)). A summary of much of what we will cover here can be found in chapter 4 of *Atmospheric Science: An Introductory Survey (2nd edition)*, by J. Wallace & P. Hobbs, Academic Press. https://www.elsevier.com/books/atmospheric-science/wallace/978-0-12-732951-2 (Links to an external site.). Here is the link to a downloadable pdf (must access via a UCSD IP): http://uclibs.org/PID/240988 (Links to an external site.)

Coursework and Evaluation

The coursework consists of four homework sets that center on development of simple radiative transfer models. These homework assignments will require use of a higher-level programming language like matlab, python, IDL, etc. If this is an issue, talk to me now so I can help get you setup. There are no exams. The final grade will be determined according to the following scale:

A: 100-93	A-: 92-90	
B+: 89-87	B: 86-83	B-: 82-80
C+: 79-77	C: 76-73	C-: 72-70

D: 69-60 F: Less than 60

Class Schedule

Disclaimer: I may swap some topics around, so the schedule below may change over the course of the quarter.

Week	Lecture	Topic	Dates	Reading (Petty)
1	1	Intro, syllabus, coding up your Monte Carlo model	3/30	1
	2	Intro to E-M radiation	4/1	2.1-2.8, 3.1-3.3, 4.1
2	3	Extinction & Beer's Law	4/6	7.1-7.3
	4	Blackbody radiation & Emissivity	4/8	6.1-6.3
3	5		4/13	
	6	Weighting function, well-mixed gasses, size distributions **Homework 1 due**	4/15	7.4
4	7	Schwarzchild's Equation	4/20	8.1-8.3
	8		4/22	
5	9	Gaseous Absorption	4/27	9
	10	Broadband Fluxes **Homework 2 due**	4/29	10
6	11	RTE with scattering	5/4	11.1-11.4
	12		5/6	
7	13	Scattering/absorption by particles	5/11	12.1-12.4
	14	**Homework 3 due**	5/13	
8	15	Radar reflectivity & size distributions	5/18	12.5
	16	Multiple scattering	5/20	13.1-13.4
9	17	Two Stream Solution	5/25	13.5-13.8

	18	Radar Reflectivity	5/27	
10	19	Applications	6/1	
	20	**Homework 4 due**	6/3	