SIOC 251: Radiation the Atmosphere

Spring Quarter 2024
11:00-12:20, Tuesday and Thursday
Eckart 227

Instructor

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Office hours

Tuesdays, 1-2 pm 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/ofhqh3gLinks to an external site.) or directly from the publisher (https://tinyurl.com/n9cj9z98Links to an external site.), or you can purchase the e-book version at the Apple Store (https://tinyurl.com/wy9a829yLinks 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/978-0-12-732951-2Links to an external site.. Here is the link to a downloadable pdf (must access via a UCSD IP): http://uclibs.org/PID/240988Links to an external site.

Coursework and Evaluation

The coursework consists of five homework sets worth 25 points each that center on the 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
Please note that the schedule may change as we progress through the material.

Week	Lecture	Topic	Dates	Reading (Petty)
1	1	Introduction & syllabus. Post your introduction.	4/2	1
	2	Intro to E-M radiation	4/4	2, 3, 4.1
2	3	Reflection and Refraction	4/9	4.2--4.3, 5
	4	Thermal Emission	4/11	6
3	5	Atmospheric Transmission. Homework 1 due	4/16	7
	6	Continued	4/18	
4	7	Atmospheric Emission	4/23	8
	8	Continued	4/25	
5	9	Gaseous Absorption, Homework 2 due	4/30	9
	10	Broadband Fluxes	5/2	10
6	11	RTE with scattering	5/7	11
	12	Continued	5/9	
7	13	Scattering & absorption by particles	5/14	12
	14	Continued	5/16	
8	15	Continued (radar reflectivity), Homework 3 due	5/21	
	16	Multiple scattering	5/23	13
9	17	Two Stream Solution	5/28	
	18	Radiative Equilibrium	5/30	Salby Handout
10	19	Radiative Convective Equilibrium, Homework 4 due	6/4	
	20	Delta-scaling, other topics of interest	6/6	