

SIO 172: Physics of the Atmosphere

Winter Quarter 2022

11:00—12:20, Tuesday & Thursday

Eckart 227 -- online first 4 weeks

Instructors

Prof. Amato Evan

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Office hours (online or in person): Tuesday 1:00-2:00 or by appointment

Nierenberg hall 441

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Office hours: TBD

In-Person and Remote Options

Because of the uncertainty associated with the stupid pandemic this course is offered both in-person and remotely. You are welcome to attend in either manner, at any time. The zoom version of the course will be recorded and available to watch at any time via our Canvas site. However, you will likely get FAR MORE out of the course if you attend in-person. So please, if at all possible, attend the lectures in person.

Remote (Zoom) login:

Please note that *all zoom lectures will be recorded and posted to our classes Canvas site*. You can only access the zoom meeting through a UCSD ip address. So this means [you will need to VPN if you are off-site](#)[Links to an external site.](#)

Course description

This course provides an understanding of the physical principles governing the behavior of the Earth's atmosphere, with emphasis on the atmospheric thermodynamics, radiation and clouds. Upon completion of this course, students will be able to identify and understand atmospheric

processes that influence weather and climate. In plain language, after taking this course you will understand much of the weather around you and know how to interpret meteorological data, including satellite data, atmospheric soundings, and forecast model output.

Course Canvas Website

I will post all of my lecture notes and slides, the lecture podcast (made from the tent), and the recordings of the simultaneous zoom meeting on the TritonEd Canvas website for our course, <https://canvas.ucsd.edu/courses/33947>. If you feel uncomfortable with being included in the course recordings, you do have the option to leave your camera off and stay muted throughout.

Required textbook

Fortunately the textbook for this course is freely available through the library. However, if you are really interested in the subject, I recommend purchasing this great resource:

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.)

And here is the link to the downloadable pdfs (must access via a UCSD IP): <http://uclibs.org/PID/240988> (Links to an external site.)

Evaluation

There will be one mid-term and one final examination. The exams will primarily consist of essay-type questions and quantitative problem solving. The materials included in exams will be taken directly from lectures, class discussions, and textbook reading assignments. Exams are open book/open note/open internet.

There will be 4 Weather Blog assignments and 2 lab assignments. The Weather Blog assignments will start out simple and then grown in complexity. Mid-way through the quarter I will offer an extra credit assignment that will be worth up to 5 percentage points towards your final grade. I will also provide you will two sets of practice problems for the final exam that you can hand in at the time of your exam for up to 2.5 points extra credit (we will do some of these problems together in class).

Assignment	Percentage	Due Date
Weather Blogs:	20%	1/13, 2/1, 2/24, 3/10
Lab Assignments:	20%	2/8, 3/10
Mid-term Exam:	30%	Tuesday, February 8

Final Exam: 30% Thursday, March 17

Your 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

Course Schedule

Lecture	Topic	Date	Reading
1	Introduction: Thermodynamics: Basics	1/4 Tu	WH 1, 2
2	Thermodynamics: Gas Law, Hydro Balance	1/6 Th	WH 3.1, 3.2
3	Thermodynamics: 1 st Law, Adiabatic Processes	1/11 Tu	WH 3.3, 3.4
4	Thermodynamics: Water Vapor, Second Law Due: Weather Blog 1	1/13 Th	WH 3.5, 3.6
	Balloon Launch (Meet at Scripps Pier) tentative	1/18 Tu	
5	Thermodynamics: Theta-e, Stability	1/20 Th	WH 3.6, 3.7
6	Thermodynamics: Stability	1/25 Tu	
7	Thermodynamics: Stability, Sonde Exercise	1/27 Th	
	Thermodynamics: Summary Due: Weather Blog 2	2/1 Tu	
8	Radiation: Introduction	2/3 Th	WH 4.1

	Midterm Exam (through lecture 7)	2/8 Tu	
	Due: Sounding Lab		
9	Radiation: Blackbody Radiation & IR Satellite Imagery	2/10 Th	WH 4.2, 4.3
10	Radiation: Refraction, Mirages	2/15 Tu	WH 4.4
11	Radiation: Dispersion, Rainbows, Halos	2/17 Th	
12	Radiation: Scattering, Transmission, Absorption	2/22 Tu	WH 4.5
13	Radiation: Optical Phenomenon	2/24 Th	
	Due: Weather Blog 3		
14	Radiation: Simple Climate Model	3/1 Tu	WH 4.6
15	Radiation: Simple Climate Model cont.	3/3 Th	
16	Cloud Physics: Cloud Types & Nucleation	3/8 Tu	WH 6.1, 6.2
17	Cloud Physics: Structure, Droplet Growth & IN	3/10 Th	WH 6.4-6.6
	Due: Weather Blog 4, Flux Lab		