SIO 173 (Spring Quarter 2017)
Dynamics of the Atmosphere and Climate

Instructors:	Joel Norris	327 MESOM	822-4420	*jnorris@ucsd.edu*
	Shang-Ping Xie	323 MESOM	822-0053	*sxie@ucsd.edu*

Meeting Time and Location: Warren Lecture Hall 2208 Tues/Thurs from 2:00 to 3:20 p.m.

Office Hours: By appointment

Course Description: Introduction to the dynamical principles governing the atmosphere and climate using observations, numerical models, and theory to understand atmospheric circulation, weather systems, severe storms, marine layer, Santa Ana winds, El Nino, climate variability, climate change, and other phenomena

Grading Criteria: 40% homework, 20% midterm exam, 40% final exam

Textbooks: *Atmospheric Science: An Introductory Survey* (2nd edition)
J. M. Wallace and P. V. Hobbs
Online textbook (UCSD only):
http://www.sciencedirect.com/science/book/9780127329512
Textbook companion materials:
http://booksite.elsevier.com/9780127329512/?ISBN=9780127329512

Websites:
Course: On UCSD TritonEd
MetEd: https://www.meted.ucar.edu/
This provides useful online modules on a variety of topics (quick registration required).

Attendance Expectations: Students are expected to attend every lecture.

Reading Expectations: Students are expected to read the assigned material ahead of class.

Homework Exercises: Homework exercises must be completed on time and extensions will be granted only in exceptional circumstances.

Collaboration: Students may collaborate on homework exercises as long as each student does his or her own work. No collaboration is allowed on exams.

Examinations: There will be a midterm exam and a final exam.

Course Schedule

Date	Instructor	Topic	Reading	HW
Tu 4/4	Both	Intro to Atmosphere and Climate		
Th 4/6	Norris	Thermodynamics I *key concepts: advection, surface pressure, vertical structure, gas law, hydrostatic, hypsometric*	WH 1.1-3, 3.1-3 *focus on 1.2, 1.3.2, 1.3.4, 3.1.0, 3.2, 3.4*	
Tu 4/11	Norris	Thermodynamics II *key concepts: adiabatic, potential temperature, saturation, latent heat, lapse rate, Skew-T plot*	WH 3.4-5 *focus on 3.4.1-3, 3.5.1-4* **MetEd A**	
Th 4/13	Norris	Convection *key concepts: absolute and conditional stability, CAPE and CIN*	WH 3.6, 8.3.1a *focus on 3.6, 8.3.1a* **MetEd B**	
Tu 4/18	Xie	Kinematics and Forces	WH 7.1, 7.2.1-3	HW 1 due
Th 4/20	Norris	SIO Pier Field Trip		
Tu 4/25	Xie	Balanced Flow, Thermal Wind	WH 7.2.4-7 **MetEd C** **MetEd D**	
Th 4/27	Xie	Vorticity	WH 7.2.8-10	
Tu 5/2	Xie	Primitive Equations	WH 7.3	
Th 5/4	Xie	Tropical Climate and Weather	WH 7.4 **MetEd F**	HW 2 due
Tu 5/9	Xie	Midterm Exam		Midterm
Th 5/11	Xie	El Nino/Southern Oscillation Natural Climate Variability	WH 10.2.2 WH 10.2.1, 10.2.3 **MetEd G**	
Tu 5/16	Xie	Climate Change	WH 10.3-4 **MetEd I**	
Th 5/18	Xie	Weather and Climate Prediction	WH 7.5, 10.5 **MetEd H**	

Tu 5/23	Norris	Weather Maps and Cyclones I *key concepts: low centers, fronts, clouds, precipitation, weather maps, satellite images, radar*	WH 8.1.1-2 **MetEd E**	HW 3 due
Th 5/25	Norris	Weather Maps and Cyclones II *key concepts: upper level troughs, jet stream, cyclone structure, trajectories*	WH 8.1.3-4	
Tu 5/30	Norris	Boundary Layer *key concepts: turbulence, surface fluxes, vertical structure, diurnal cycle, entrainment*	WH 9.1-4 *focus on 9.1.1-5, 9.2.1-2, 9.3.1-2, 9.4.1*	
Th 6/1	Norris	Severe Storms (Dillon Amaya)	WH 8.3	HW 4 due
Tu 6/6	Norris	California Weather	WH 8.2.4-5, 9.5.2	
Th 6/8	Norris	Review Session		
Tu 6/13	Xie	Final Exam		Final

MetEd A – Skew-T Mastery
MetEd B – Principles of Convection: Buoyancy and CAPE (*focus on basics*)
MetEd C – Topics in Dynamical Meteorology: Pressure Gradient Force
MetEd D – Topics in Dynamical Meteorology: Thermal Wind
MetEd E – Introduction to Meteorological Charting
MetEd F – Introduction to Tropical Meteorology Chapter 1: Introduction
MetEd G – The El Niño-Southern Oscillation (ENSO) Cycle
MetEd H – Introduction to Climate Models
MetEd I – Climate Variability and Change