ATSC 5700
Numerical Modeling of the Atmosphere
Spring 2017

LECTURE: M,W: 3:10-4:25

LABORATORY:

INSTRUCTOR:
Dr. Xiaohong Liu, Professor of Atmospheric Science
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OFFICE HOURS: T 2:00 – 3:00, Th 2:00 - 3:00; Other times by appointment.

DESCRIPTION: This advanced-level graduate course draws on the fundamental concepts learned in the core curriculum, emphasizing the application to numerical modeling. The course begins with a review of governing equations and assumptions as well as fundamental processes in the atmosphere. We then delve into the details of representing these equations in a numerical framework, focusing on Eulerian models. We will explore designs, features and applications of atmospheric models with different spatial and temporal scales widely used in the atmospheric science, ranging from the parcel models, kinematic models, large-eddy simulating (LES) models, cloud resolving models (CRM), to the large-scale regional and global climate models (GCMs).

SUGGESTED TEXTBOOKS:
A First Course in Atmospheric Numerical Modeling – A. DeCaria and G. Van Knowe
Fundamentals of Atmospheric Modeling – M. Jacobson
Numerical Techniques for Global Atmospheric Models – P. Laurizen, C. Jablonowski, M. Taylor, R. Nair

ASSIGNMENTS: The focus of this course is on the *application* of topics taught in core atmospheric science course to numerical modeling of the atmosphere. Thus, the assignments will be extensions of the laboratory activities, designed to test your ability to not only run, edit and even create numerical models but also to analyze the results, especially in the context of numerical uncertainties and errors.
There will be no make-up quizzes without an 'official excuse'!

ATTENDANCE: While attendance will not be taken during class, you are ***strongly*** encouraged to attend all lectures.

ACADEMIC INTEGRITY: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner.
All students are expected to act in accordance with this principle, thereby acting with personal integrity, respecting other students' dignity, rights and property, and helping to create and maintain an environment in which all can succeed through the fruits of their own efforts. Acts of plagiarism, falsification, misrepresentation, or deception will not be tolerated, because they violate the fundamental ethical principles of the academic community and compromise the worth of work completed by others. Evidence of plagiarism and/or cheating can result in expulsion from the course (with an F grade), and if repeated, dismissal or suspension from the University of Wyoming. See: ***http://www.uwyo.edu/generalcounsel/_files/docs/UW-Reg-6-802.pdf***

LECTURE TOPICS:

Week 1	Review of governing equations and assumptions
Week 2	Finite differencing
Week 3	Boundary conditions
Week 4	Subgrid-scale processes
Week 5	Boundary layer processes
Week 6	Cloud thermodynamics, dynamics, and microphysics
Week 7	Aerosol and atmospheric chemistry
Week 8	Radiation
Week 9	Parcel models
Week 10	Kinematic models

Week 11	Dynamical models: LES
Week 12	Dynamical models: CRM
Week 13	Dynamical models: GCM
Week 14	Presentation of Final Projects

DISSABILITY SUPPORT: If you have a physical, learning, or psychological disability that requires accommodations, please contact the University Disability Support Services Office within SEO, in Room 330 of Knight Hall. To be granted an accommodation, you will need to register with them and to provide documentation of your disability.

FINAL PROJECT: The final project for this course will consist of a group modeling project. Details will follow as the semester proceeds. Final project presentations will be given during final week of the semester.

GRADING:

Mid-term Exam	30%
Homework	30%
Final Project	40%

The plus/minus grading scale will be used for this class. The following is provided as a guideline and is subject to change.

COURSE GRADES:

above 93%	–	A	70-77%	–	C
90-93%	–	A-	60-70%	–	D
87-90%	–	B+	below 60%	–	F
83-87%	–	B			
80-83%	–	B-			
77-80%	–	C+			