

MEA 712: (An Introduction to) Mesoscale Atmospheric Modeling

Fall Semester 2009

Professor:	Dr. Matthew D. Parker Jordan Hall 5149 513.4367, or main departmental office 515.3711 mdparker@ncsu.edu Office hours: by appointment
Class meetings:	Tues., Thurs., 1:30–2:45 PM Jordan Hall 1109, with in–class work sessions in 5214
Pre–requisites / Expectations:	Undergraduate dynamics (e.g. MEA 421–422) Proficiency in FORTRAN (e.g. CSC 112) Ability to take output from codes you write and plot it (we will have some review and practice, but not full instruction)
Recommended text:	<i>Numerical Methods for Wave Equations in G. F. D.</i> , by Dale Durran
Class website:	http://www.meas.ncsu.edu/mdparker/courses/mea712/index.html links to handouts, images from class, help on assignments, etc.

Student learning outcomes: By the completion of this course, you should be able to:

Specific:

- 1) recognize and apply the basic numerical schemes used in atmospheric modeling, and recall their basic properties (stability, accuracy, diffusiveness, etc.)
 - 2) quickly and accurately code basic numerical schemes
 - 3) create, identify, explain, debug, and modify the components of a realistic atmospheric model
 - 4) plot and interpret output from the above basic numerical schemes and realistic atmospheric model
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Overarching:

- 5) recognize and analyze the components of unfamiliar atmospheric models
 - 6) identify sources of error in model output and associate them with properties of the model
 - 7) design and carry out an experiment that uses an atmospheric model intelligently
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Course philosophy: This is a graduate level course, and it is an elective. The level of difficulty will be set to maximize the benefit to the strongest students. If you have serious doubts about your ability to complete the coding assignments, please consult with me. The workload in this course will be high, but there will be no formal exams.

Special accommodations: You have the right to appropriate, confidential accommodations of a disability. “Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.1)”

Assessments: As stated above, there will be no exams. Your grade will be determined by your performance on the following assignments: a handful of short assignments in class (to be checked for completeness and presented to the class), a midterm assignment, the Class Mesoscale Model (CMM) tasks (6 total) on the syllabus, and a final semester project that you will perform using the CMM (you will present this to the class and submit a paper of modest length).

Grading criteria: 30% from your scores on the six CMM tasks; 30% from your score on the end-of-semester project; 15% from your scores on roughly five short assignments, including presenting them to class when asked; 15% from your score on the Midterm Assignment; and, 10% based on participation (attendance, discussion when homework is presented, etc.). Your final letter grade will follow the familiar scale: $\geq 93\%$ A, 90–92 A-, 87–89% B+, 83–86% B, 80–82% B-, etc. I will adjust this at the end if the grade distribution looks too low. University regulations concerning withdrawals and incompletes will be strictly enforced.

Course organization: We will have 8-10 work sessions in the computer lab. The purposes of these sessions is not to save all of your homework for the last minute, but rather to have communal coding and debugging time with the instructor present as a resource. The remainder of the course will be in the standard classroom style. On a handful of occasions, there will be short assignments that will be presented by a student or two to the rest of the class, for analysis and discussion.

Coding philosophy: Graduate students should have mature attitude about their studies: benefit comes from expending effort! Every student must write his/her own codes. It is fine to consult with another student in trying to debug a code, but you should **never** copy and paste code from another student. I consider this to be a violation of the Student Conduct Policy, and will treat it as academic dishonesty. Yes, it's easy to either a) crib code from someone else, or b) run someone else's model and submit their output as your own when your model isn't working. I know the tricks, and I'm not stupid. I reserve the right to inspect your code for uniqueness and to ask you to run it in front of me to verify that it actually functions as it's supposed to.

Final coding note: writing good code and debugging it is hard work, but it is absolutely essential to your graduate and post-graduate life in atmospheric sciences. Spend the time, gain the experience, and learn.

I will not debug your code for you! Don't ask, because I will say no.

Academic integrity: It is expected that students are versed in the Code of Student Conduct Policy, and will abide by it. Repeated here are the provisions relating to academic dishonesty.

1. Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student's record or academic career.

2. A student is guilty of a violation of academic integrity if he or she:

- represents the work of others as his or her own;
- obtains assistance in any academic work from another individual in a situation in which the student is expected to perform independently;
- gives assistance to another individual in a situation in which that individual is expected to perform independently;
- offers false data in support of laboratory or field work.

You have committed academic dishonesty if you give, receive, or tolerate others' use of unauthorized aid. Violations of academic integrity will result in automatic failure of the class and referral to the proper university officials. The work that you submit must be your own and you must have completed it specifically for the particular assignment in this class. Make no assumptions: please contact me if you are unsure about whether I have authorized a source of aid.