

DEPARTMENT OF ENVIRONMENT & GEOGRAPHY – COURSE OUTLINE

GEOG 4330/7330 Concepts in Atmospheric Modelling (2016) (3-Credit Hours)

Instructor:

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Lectures: Mon 2:30-5:30 pm 243 Wallace Bldg
Office Hours: by appointment via email

Textbook: None

Reference Material:

Stull, R. B., Meteorology for Scientists and Engineers. 3rd ed. 2015 found at:
http://www.eos.ubc.ca/books/Practical_Meteorology/
Stull, R. B., Meteorology for Scientists and Engineers. 2nd ed. Pacific Grove, CA: Brooks/Cole, c2000
Fundamentals of atmospheric modeling by Mark Z. Jacobson, University Press, 1999.
Atmospheric Modeling, data assimilation and predictability by E. Kalnay, Cambridge Press, 2003.
Fundamentals of atmospheric physics by Murry L. Salby, Academic Press, 1996.

Course Description

This course will primarily focus on numerical modeling applications and techniques of the Earth's atmosphere with an emphasis on weather prediction. This includes understanding basic modeling terminology, numerical schemes, structure of models, types of models, what is required to run a model, and an introduction to data assimilation and ensemble techniques to weather prediction.

Much of the course material is online (https://www.meted.ucar.edu/training_detail.php) (select “Numerical Modeling (NWP)” from the drop down menu in the “Topics” on the main page. **Be sure to add my email to your MetEd account profile so your quiz scores come to me.**

The course structure is as follows.

1. **Module 1:** Model fundamentals – Version 2 (web page above)
2. **Module 2:** Model Essentials: structure & dynamics (web page above)
3. **Module 3:** Model Essentials: precipitation and clouds (web page above)
4. **Module 4:** Model Essentials: model physics (web page above)
5. **Module 5:** How mesoscale models work (web page above)
6. **Module 6:** Model Essentials: Data Assimilation (web page above)
7. **Module 7:** (use web page above)
 - (a) Introduction to ensemble prediction
 - (b) Introduction to Ensembles: Forecasting Hurricane Sandy (**Do Not Do the Quiz !!**)

Term Work and Allocation of Marks

Undergraduate Students

- Assignments and online quizzes (all of equal value; 60% of marks) and one paper/presentation (40% of marks) will make up the total marks for this course.

Assignments

- Assignment 1 (due Jan. 25)
- Online Quiz (Modules 1 and 2) (due Jan. 25)
- Online Quiz (Module 3 – includes specific CP schemes) (due Feb. 1)
- Online Quiz (Module 4) (due Feb. 8)
- Online Quiz (Module 5) (due Feb. 29)
- Online Quiz (Module 6) (due Mar. 14)
- Online Quiz (Module 7 – do Introduction to Ensemble Prediction only) (due Mar. 28)
- Assignment 2 (article review of data assimilation applications) (due Apr. 4)

Paper/Presentation (paper = 20%; presentation = 20%)

Each student will write a summary paper (**due Apr. 4**, no more than 6 single-spaced pages but no less than 4 single-spaced pages in length) on a topic of interest to them relevant to the course content and will present their material to the class (**tentative date of Mar. 28**) with a 10 minute talk. Topics may include, but not limited to, convection schemes/parameterizations, microphysical schemes/parameterizations, land surface schemes used in NWP, data assimilation (theory or application) or ensembles (theory or applications) – other topics will also be considered but must be verified by the instructor prior to one being selected.

Graduate Students

- Same as undergraduates except total marks for assignments/tests will be worth 90% of the final mark.
- The remaining 10% of the course mark will be devoted to a special project (written/oral) that will be determined at a later date.

Due dates of assignments and course paper will be provided in class. Late assignments/papers will be subject to a 15% deduction of the grade per late day (including weekends/holidays). The final date for voluntary withdraw from this course is March 18, 2016. Students may have access to their marks prior to this date and are encouraged to talk with me before a decision to withdraw is made.

An assigned grade will correspond to the following range in marks:

A+	90% and over	C+	66-69%
A	80-89%	C	60-65%
B+	76-79%	D	50-59%
B	70-75%	F	less than 50%

Academic Dishonesty

Students should acquaint themselves with the University's policy on cheating and examination impersonation (see Section 3.5 of the University of Manitoba General Calendar). Students are expected to acknowledge the source of ideas and quotes in their work. Plagiarism and cheating in general, is a serious academic offence.