

DEPARTMENT OF ENVIRONMENT & GEOGRAPHY – COURSE OUTLINE
GEOG 4780 and 7780 Storms - Mesoscale Meteorology (Fall 2015)
(3-Credit Hours)

Instructors

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Lectures: Tues and Thur at 1430-1545 in Room 218 Wallace
Office Hours: After class or by appointment

Reference Texts

- (1) *Mesoscale Meteorology in Midlatitudes* by P. Markowski and Y. Richardson (2010), Wiley Blackwell, 407 pp.
- (2) *Mesoscale Meteorology and Forecasting* by P. Ray (ed.) (1986), Amer. Meteor. Soc., 793 pp.
- (3) *Mesoscale Meteorological Modeling* by R.A. Pielke (1984), Academic Press, 612 pp.
- (4) *Cloud Dynamics* by R. Houze, Jr. (1993), Academic Press, 573 pp.
- (5) *Atmospheric Convection* by K.A. Emanuel (1994), Oxford Press, 580 pp.
- (6) *Severe Convective Storms*: C.A. Doswell III, ed. (2001), Meteor. Monograph, 28, 50, 1-26.
- (7) *Mountain Weather Research and Forecasting: Recent Progress and Current Challenges* by F.K. Chow, S.F.J. De Wekker and B.J. Snyder (eds.) (2012), Springer, 750 pp.

All students should ensure they have non-programmable scientific calculators.

Course Description and Objectives

This course is concerned with storms and mesoscale meteorology. These are critical aspects of atmospheric science and they bridge the temporal/spatial scales between the microscale (< 1 km) and synoptic scales (> 500 km). Mesoscale phenomena can also be embedded within larger scale weather systems. Mesoscale meteorology is particularly important now that atmospheric computer models are able to resolve these scales. Examples of mesoscale atmospheric phenomena include, but are not limited to, severe convective storms of all kinds, hurricanes, polar lows, lake effect storms, land/lake breezes, tornadogenesis, and heavy rainfall/snowfall events. Students will gain an appreciation of the fundamental factors associated with a range of storms and mesoscale phenomena through up-to-date material from textbooks and the current literature.

Term Work and Allocation of Marks

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Two (2) term assignments (15% each) = 30%

Two (2) presentations (15% each) = 30%

Two (2) tests (20% each) = 40%

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Two (2) term assignments (10% each) = 20%

Two (2) reports with presentations (25% each) = 50%

Two (2) tests (15% each) = 30%

The due dates and details of the assignments, reports and presentations will be provided in class. It will be important to attend the lectures and interact with myself and other students. Students will not be permitted to write make-up tests or hand in late assignments except for documented medical or compassionate reasons. A grade of zero will be recorded for missed assignments, tests and exams. Any make-up test or examination may not follow the same format as the in-class one. Late assignments will be penalized 25% per day (including weekends and holidays).

The final date for voluntary withdraw from this course is November 18, 2015. 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.

Course Outline

Part I

- Storms and their importance
- Winter storms (climatology, extratropical systems, transition regions)
- Surface weather hazards during winter
- Storms and orography
- Lightning
- Lake effect storms
- Polar lows
- Storms and climate

Part II

- Introduction (mesoscale scale analysis)
- The PBL, low level jets (LLJs) and their importance
- Simple theories of convection (and its initiation)
- CAPE and DCAPE
- Role of wind shear on convective mode
- Supercell storms and their propagation
- NMTs and supercell tornadogenesis
- Severe storm alerting systems (time permitting)

Departmental Grading Standard

A+	90% and over	C+	65-69%
A	80-89%	C	60-64%
B+	75-79%	D	50-59%
B	70-74%	F	< 50%

Academic Dishonesty

Students should acquaint themselves with the University's policy on cheating and examination impersonation (see Section 7.0 of the University of Manitoba General Calendar). **Plagiarism and cheating are serious academic offences.**

The University of Manitoba has a new policy on electronic contact with students that requires **all email contact on university business to use students' official University email addresses**. The policy is at:

http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html