

ATOC 541: Synoptic meteorology II

Winter 2021

WF 10:05–11:25

~~Burnside 719A~~ via Zoom

Instructor: Daniel Kirshbaum

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Office hours: Thursdays 10:00-12:00

Prerequisites:

- ATOC 312: Rotating fluid dynamics (or equivalent)
- ATOC 540: Synoptic meteorology I (or equivalent)

Textbook:

There is no required textbook for this course—the lecture notes should suffice. However, you are encouraged to consult the following textbooks to solidify and/or enhance your understanding of physical principles discussed in class. All of the books listed below are available from the McGill library.

1. *An Introduction to Dynamic Meteorology (1st-5th edition)*
J. R. Holton and G. J. Hakim
Academic Press
ISBN 9780123848666
2. *Atmosphere–Ocean Dynamics*
A. Gill
Academic Press
ISBN 9780122835223

Motivation and scope:

This course provides a quantitative analysis of synoptic dynamics in the midlatitudes, including the quasi-geostrophic system, potential vorticity, the Omega and height-tendency equations, frontal circulations, and diagnostic analysis of real-world weather systems. For mathematical simplicity and convenience, the Boussinesq system of equations is used. The expected learning outcome is to obtain a working understanding of the development and dynamics of basic processes that control day-to-day weather in the midlatitudes.

Evaluation:

- Assignments (3-4): 30%
- Midterm: 30%
- Final project: 40%

Outline:

- Weeks 1-2: Vortical motions, balanced flow, and the quasi-geostrophic (QG) system
- Week 3: QG potential vorticity

- Weeks 4-5: QG Omega and height-tendency equations
- Weeks 6-7: Extratropical cyclone dynamics
- Weeks 8-9: Midterm and frontal dynamics
- Weeks 10-12: Analysis of observed weather events
- Week 13: Project oral presentations

Miscellaneous rules and regulations

- In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.
- In accordance with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.
- In accordance with McGill Academic regulation 27, in the absence of a medical certificate or analogous circumstances, any required assignment submitted after its due date and time shall be assessed a penalty of one grading unit per day late (including weekend days).
- McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).
- If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 514-398-6009 before you do this.