

Atmospheric Dynamics I

PHYC/OCEA 4411/5411

Department of Physics and Atmospheric Science, Fall 2009

Monday and Wednesday @ 11:35 - 12:55 in Dunn 302

Lecturer: Dr. Thomas J. Duck, Dunn 128

Office Hours: 3:30–4:30 PM on Monday and Tuesday

Web Site: <http://aolab.phys.dal.ca/~tomduck/classes/physc4411>

Overview: *Atmospheric Dynamics* describes the fluid motions of the atmosphere in terms of fundamental physical laws using the language of mathematics. Part I deals mostly with establishing basic principles and deriving the governing equations, whereas Part II focuses on applications, including weather.

Required background:

1. Integral and differential calculus
2. Differential equations and partial differential equations
3. Vector algebra (vector spaces, dot and cross products, vector identities, ...)
4. Vector calculus (div, grad, curl, Gauss's divergence theorem, Stokes' curl theorem, ...)
5. Curvilinear coordinates (cylindrical, spherical, ...)

Topics:

1. Conservation laws
2. The Navier-Stokes equations
3. Scale analysis
4. Balanced flow
5. The governing equations
6. Circulation and vorticity

Grading breakdown:

Quizzes	20%
Assignments ..	20%
Midterm	25%
Final	35%

FOS grading scheme:

A+	90-100%
A	85-89.9%
A-	80-84.9%
B+	75-79.9%
B	70-74.9%
B-	65-69.9%
C+	62-64.9%
C	58-61.9%
C-	55-57.9%
D	50-54.9%
F	< 50%

Test dates:

Test I	October 5
Midterm test ..	October 26
Test II	November 18
Final Exam ...	Exam period

continued on reverse

References:

Holton, J.R., An Introduction to Dynamic Meteorology, 2004, Academic, 511 pp., ISBN-10: 0-12-354015-1. (Available in bookstore)

Gill, A. E., Atmosphere-Ocean Dynamics, 1982, Academic, 662 pp., ISBN 0-12-283522-0.

Schey, H. M., Div, Grad, Curl and All That: An Informal Text on Vector Calculus, 3rd edition, 1997, W. W. Norton & Company, 164 pp., ISBN 0-393-92516-1.

REGULATIONS: The class will adhere to the University Regulations (<http://www.registrar.dal.ca/calendar/ug/UREG.htm>) and Academic Regulations (<http://www.registrar.dal.ca/calendar/ug/acrg.htm>) outlined in the Dalhousie Calendar (<http://www.registrar.dal.ca/calendar/>).

CLASS POLICY ON COLLABORATION: Students are allowed to discuss assignments. However, evidence of copying between students on any assignment problems will result in a score of zero on the assignment for both students.

CLASS POLICY ON LATE ASSIGNMENTS: Assignments will not be accepted after the due date without prior approval by the lecturer.

CLASS POLICY ON MISSED TESTS AND QUIZZES: Alternative arrangements for completing missed tests and quizzes will be made given the submission of appropriate documentation, as per Dalhousie's Academic Regulations.