

# PHYC14H3 Syllabus – Winter 2023

## Introduction to Atmospheric Physics

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Office Hours: To be announced & by appointment

Textbook: Atmospheric Science, An Introductory Survey, Second Edition,  
John M. Wallace and Peter V. Hobbs, Academic Press, 2006.

Recommended Reading: IPCC AR6 WG1 Summary for Policymakers ([link](#))

### General description

The course provides an introduction to atmospheric physics. Topics include atmospheric structure, atmospheric thermodynamics, convection, general circulation of the atmosphere, radiation transfer within atmospheres and global energy balance. Connections will be made to topics such as climate change and air pollution.

Prerequisites: PHYB21H3, PHYB52H3, MATB42H3, MATB44H3

Exclusions: PHY392H1, PHY315H1, PHY351H5

### Course organization

Lectures: Fridays, 1 – 3 PM, HL B106

Tutorial: Wednesdays, 4 – 5 PM, AC334

### Safety & COVID

Due to the ongoing COVID pandemic, the use of medical masks (or better) continues to be strongly recommended at U of T Scarborough in indoor settings.

### Absences

In the event of legitimate medical absences, students must follow the DPES policy and submit the DPES Student Absence Form. Read the details and procedure [here](#). In the case of an appropriately documented absence, please discuss the impact on your work with the instructor.

### Questions and email policy

You can use the discussion board on Quercus to ask questions about the course and its content.

My email policy is to respond within two business days. Students must include PHYC14 in the email subject and provide their full name and student number in their message. Messages must be sent from a U of T email address.

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### Course Evaluation

Research Report:	15%
Problem Sets:	25%
Mid-term Test:	20%
Final Exam:	40%

*Requests for re-grading of any coursework must be submitted to the instructor within one week of being returned.*

### Tentative lecture schedule

Week	Dates	Topic	Textbook section(s)
1	Jan. 09 – 13	Course introduction Atmospheric composition and structure	Chapters 1 & 2
2	Jan. 16 – 20	Atmospheric Thermodynamics I: hydrostatic equation, adiabatic processes	3.1 – 3.4
3	Jan. 23 – 27	Atmospheric Thermodynamics II: convection and stability	3.5 – 3.7
4	Jan. 30 – Feb. 03	Atmospheric Radiation I: scattering, absorption, and emission processes	4.1 – 4.4
5	Feb. 06 – 10	Atmospheric Radiation II: Schwarzschild's equation, Beer's Law	4.5 – 4.6
6	Feb. 13 – 17	Global Energy Balance	
	Feb. 20 – 24	Reading Week	
7	Feb. 27 – Mar. 03	Midterm test	
8	Mar. 06 – 10	Atmospheric Chemistry and Air Quality	Chapter 5
9	Mar. 13 – 17	Atmospheric Dynamics I: Boundary layer	9.2 – 9.6
10	Mar. 20 – 24	Atmospheric Dynamics II: Global Circulation	7.3 – 7.4
11	Mar. 27 – 31	Climate dynamics: variability, feedbacks, and sensitivity	Chapter 10
12	Apr. 03 – 10	Atmospheric Observation: ground-based and satellite-based techniques	

## Course Components

### Research Paper (15%)

A research report describing the physics of an atmospheric monitoring instrument. Details will be provided in a document posted to Quercus.

Late Penalty:  $N^3\%$  per day, where  $N$  is the number of days.

### Problem sets (25%)

There will be four problem sets, worth 6.25% each. Late Penalty: 25% per day.

### Midterm Test (20%)

A 2-hour midterm test will be scheduled during the term, tentatively planned for week 7. It will cover content from the lectures and assigned sections of the textbook. It may consist of multiple choice and detailed calculation questions.

You will be permitted to bring a non-programmable calculator and a single 8.5" by 11" sheet of paper with hand-written notes on both sides (no photocopies or printed material) for the tests.

Physical constants will be provided. Equations will not be provided.

### Exam (40%)

The exam will be scheduled during the exam period: April 13 – 27. It will be 3 hours long. The format will include multiple choice and detailed calculation questions. The exam will cover the lectures and assigned sections of the textbook. The exam is cumulative.

You will be permitted to bring a non-programmable calculator and a single 8.5" by 11" sheet of paper with hand-written notes on both sides (no photocopies or printed material) for the exam.

Physical constants will be provided. Equations will not be provided.

## Technical problems

If there are technical issues related to U of T tools, e.g., access to Quercus, please contact: [helpdesk@utsc.utoronto.ca](mailto:helpdesk@utsc.utoronto.ca)

## U of T Policies

### Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Details: <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering documentation, including (but not limited to) doctor's notes.

Academic integrity rules are monitored and strictly enforced.

### Recordings

Recording or photographing any aspect of a university course - lecture, tutorial, seminar, lab, etc. – without prior approval of all involved and with written approval from the instructor is not permitted. In the case of private use by students with disabilities, the instructor's consent will not be unreasonably withheld.

### Accessibility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services as soon as possible.

AccessAbility Services staff (located in room AA142) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email [ability.utsc@utoronto.ca](mailto:ability.utsc@utoronto.ca). The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.